THE GARDEN JOURNAL

OF THE NEW YORK BOTANICAL GARDEN

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Free Saturday Afternoon Lecture Programs will resume October 1, 1955.

Fall Courses in the Educational Program will start in September. Copy may be had of the new Educational Program, which will be available in late summer, on request.

THE GARDEN JOURNAL
of The New York Botanical Garden

DOROTHY EBEL HANSELL
Editor

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CREDIT FOR ILLUSTRATIONS

Cover illustration from **Hortus Eystettensis**—photograph of original plate by E. N. Mitchell; pp. 105, 106, 107, courtesy of Beatrix Farrand; pp. 108, 109, Agricultural Institute, West Bengal; pp. 114, 115, Leland C. Marsh; pp. 116, 117, Bernard L. Lewis, Inc.; pp. 118, 119, T. A. Weston; p 120, top, T. A. Weston, bottom, Monsanto Chemical Co.; pp. 123, 124, 125, Peggie Schulz; p. 126, The New York Botanical Garden; p. 127, Agricultural Institute, West Bengal; p. 129, Leland C. Marsh; p. 130, first col., Central Exp. Farm, Ottawa, Canada; second col., Chester K. Strong, third col., F. L. Skinner; p. 137, E. N. Mitchell; p. 138, upper, Gottscho-Schleisner, lower, Keystone Studio; p. 139, upper, Samuel H. Gottscho.

AMONG OUR CONTRIBUTORS

BEATRIX FARRAND is one of America's great landscape gardeners, an extraordinarily able person, exceptionally well informed on plant material. During her busy career she has been landscape consultant to Yale and Princeton Universities and to the University of Chicago, Overland College, Arnold Arboretum, and Santa Barbara Botanic Garden. Mrs. Farrand landscaped the estate of Mr. and Mrs. Robert Woods Bliss, now Dumbarton Oaks Art Museum of Harvard University. She is founder and president of Reef Point Gardens and the recipient of many medals and awards including the Distinguished Service Award of The New York Botanical Garden. . . . The duties of J. W. E. H. SHOLTO DOUGLAS, an agronomist with the Ministry of Food, have been largely in India since 1946 where he has been officer in charge of hydroponics development. When a war-time officer, on active service in the southeast Asia theater of operations, Douglas, who was educated as agronomist at the University of Reading, England, became greatly interested in the problem of the resettlement into civil life of discharged soldiers. The crux of the whole problem was the provision of new land for modern farms. In the Darjeeling district especially, pressure on available agricultural land was colossal. Douglas remembered soilless cultivation, interested the proper authorities, and arrangements were made to open a research center where trials were conducted to evolve a system suitable for West Bengal. . . . ALICE L. DUSTAN writes the garden page of the *Newark Sunday Star-Ledger*, conducts adult courses and garden club workshops, and is a garden consultant and planner. She received her B.S. in botany from Rutgers and her M.S. in ornamental horticulture from Cornell. At the latter university, she specialized in small property design. Miss Dustan also attended the School of Horticulture at Ambler, Pennsylvania, and studied landscape design at the School of Architecture of Columbia University. She has been editor of the Connecticut Agricultural Experiment Station, garden editor of "House and Garden" and of "House Beautiful". . . . It was only natural that LELAND C. MARSH should pursue the study of the cattail in the Department of Science, Syracuse University, for his father has been engaged in marketing cattail leaves and leaf sheaths for thirty-five years, to the furniture and cooperage industries. As an undergraduate he started to collect literature on the cattail, continued this interest in graduate research, and is now working on his doctorate along these lines. Dr. Ernest Reed, chairman of the Department of Plant Sciences, has been sponsoring and directing Mr. Marsh's research the past two years. . . . BERNARD L. LEWIS is head of Bernard L. Lewis, Inc., specialists in the food field and in close touch with fruit and vegetable industries. Mr. Lewis travels extensively in the growing areas to photograph and gather first-hand information. . . . RUTH MARIE PETERS is editor, Window and Greenhouse Department, of "Popular Gardening", and author of *Bulb Magic in Your Window*. . . . DR. W. J. HANNA is a native of South Carolina and received a B.S. in agricultural chemistry from Clemson College in that state. After a four-year tour of duty with the Navy in World War II, he obtained his Master's degree from North Carolina State College and his Ph.D. from Rutgers where he has been in the Soils Department for the past eight years. The major part of his work as associate professor of soils is directed toward soil testing and vegetable crop nutrition, but Dr. Hanna has done some work with ornamentals and is a member of the Soils Committee of the Holly Society of America. In spite of his "know-how," he claims his wife is the better gardener. . . . T. H. EVERETT is Curator of Education and Horticulturist of The New York Botanical Garden. . . . PEGGIE SCHULZ is editor of the Hemerocallis Journal, co-editor of The Gloxinian, author of several books. Her newest book, *Growing Plants Under Artificial Light*, is the October 1955 selection of the American Garden Guild Book Club. . . . CLAIRE NORTON gardens in Laporte, Colorado, writes for magazines and newspapers, and assists her husband in his crafts and florist shops. . . . GERTRUDE B. FOSTER is editor of "Herb Grower Magazine."

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PRINTS at REEF POINT GARDENS

By **Beatrix Farrand**

Above—North end of reception room, Reef Point. Portrait of Le Notre surrounded by French Gardens.

Right—Photograph of portrait of Miss Gertrude Jekyll by William Nicholson. Given to the National Portrait Gallery by her friend, Sir Edwin Lutyens.

"*Gallia est omnes divisa in partes tres,*" and this is true in a minor way of Reef Point, at Bar Harbor, Maine. The part of the three which is best known is the gardening third, which is visited by several thousand plant lovers each year. The collection of plants numbers considerably over a thousand, and has been chosen with care in order to show what thin acid soil can happily produce in a somewhat austere climate. There are islands of less acid soil, where single roses, annuals and perennials, and kitchen gardens are growing. Many plants are aliens, but an effort has been made to blend these harmoniously into the native flora.

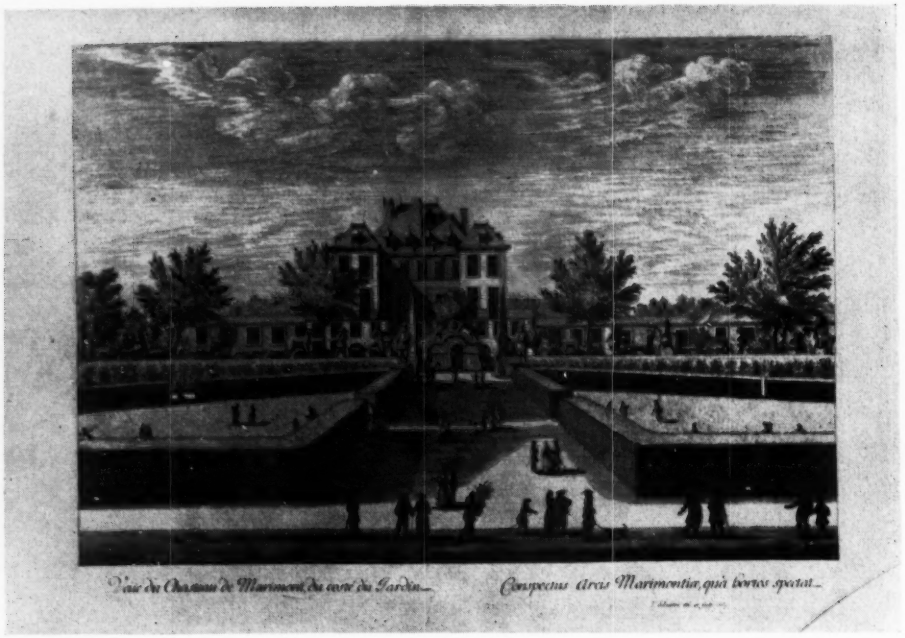
The living heart of the enterprise beats in the house with its reception room prints, and the springs which nourish the intellectual part of Reef Point rise in the Max Farrand Library and the old book room in the second story.

Many years ago, when the present owner of Reef Point was a young student, she tried to educate herself in the history of gardening and what the great garden artists of the past had achieved. In those far away days there was no course in landscape or architectural gardening; consequently, many byways were followed which today's systematized education would omit. Inevitably drawn to the old gardens of Europe on account of the paucity of like achievements at home, she was again baffled by the lack of photographs of great gardens, and as she was not an accomplished photographer herself, she was once more inevitably led to searching for prints and monographs of well-designed old gardens.

The result is seen in the reception room and libraries at Reef Point. Approximately one hundred and fifty prints hang on the walls of the various halls, passageways, and rooms, and each has been chosen to teach some aspect of garden art, whether it be a clever adaptation of a design to a difficult and unsymmetrical site, or a grand series of terraces and fountains. Each one is worthy of study, whether the strangely un-French topiary of the hedges of Marimont engraved by Israel Silvestre, or the group of great Italians from the plates of Pannini of Villa Conti, and the classic beauty of Villa Lante. The Villa d'Este is also represented in one of the most dramatic of Piranesi's plates. Many of the Italian prints hang in the entrance hall and French ones are added, many after Rigaud such as those of St. Ouen and Marli, and an Israel Silvestre group of various fountains and bosquets at Versailles.

In the large room especially arranged for meetings and conferences, the prints are all of French Gardens, presided over by Le Nôtre, where a stately portrait by Carle Marat hangs over the fireplace. The airy quality of space and light in the Rigaud prints contrasts sharply with the more sombre pattern of the Silvestres — and as they each speak unmistakably of their period of Louis XIV or Louis XV, they are interesting in their historic aspects of costumes, coaches, and general surroundings.

In the second-story room where the old books are cherished, the prints suddenly change from predominantly French and Italian gardens to those of Brabant and Flanders. The grimmer buildings, the simpler, almost monastic gardens are strikingly different from those in the entrance hall and reception

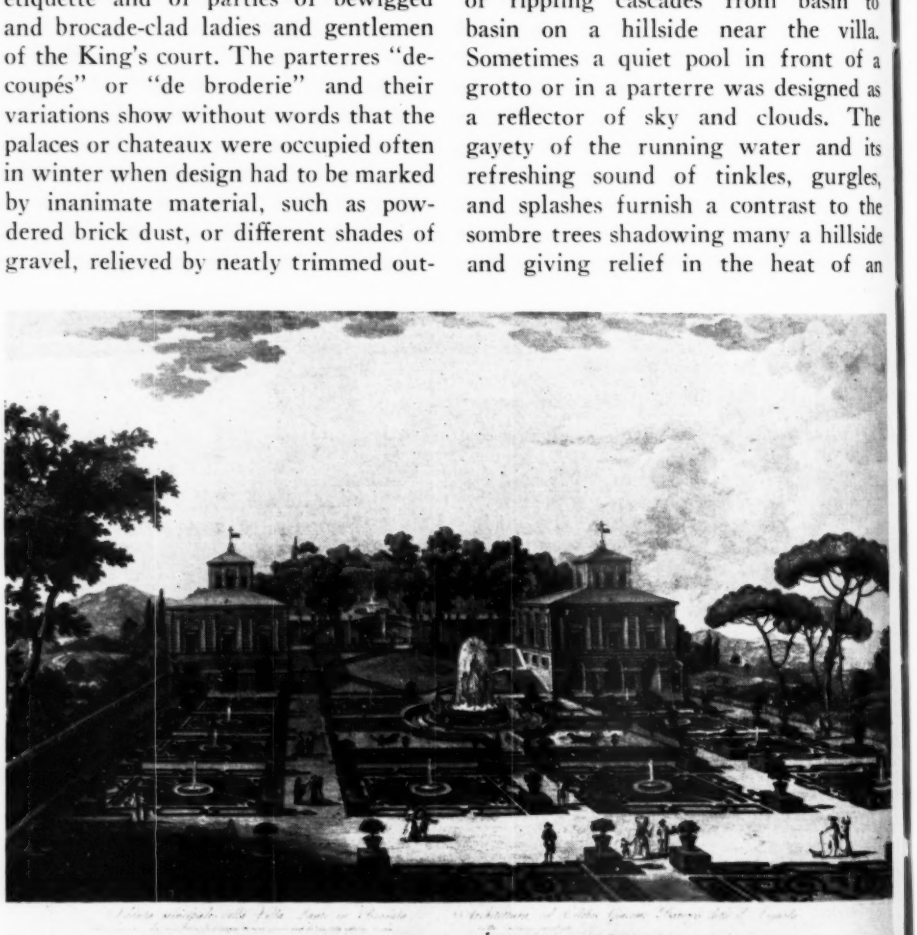


Marimont, an unusual French topiary garden. Engraved by Israel Silvestre (1621-1691).

room. There are also some unusual pictures, a pastel by Odilon Redon, a red hibiscus in water color by John La Farge, a *Clematis Jouiniana* painted at Reef Point by Sarah C. Sears, and an oil painting of lavender-colored poppies by Walter Gay, painted in Edith Wharton's garden at St. Brice-sous-Forêt near Paris. There are dozens of the so-called "vues d'optique," not of great value artistically but entertaining in their range of subjects — Constantinople, Rome, Spain, Germany, France, Holland — and all spread their bright colors in passages and alcoves. They may not be accurate as they were made to look as the engravers of the day thought they should.

In the reference library there are likenesses of Max Farrand, who used the room while he was writing some of his books, and who has given his name to the room. There are also portraits of gardeners — Gertrude Jekyll, Charles Sprague Sargent, John Evelyn, and William Robinson — and two prints of Linnaeus, one in court dress holding his favorite namesake Linnea, and one in the Lapland dress he wore when collecting in the North.

Each separate print or photograph has been chosen for its educational value. The reception room exhibits the variety of design in French gardens, the accents given by hedges, variation of levels, placing of buildings, and the use of majestic flights of stairs or steps, the animation given by vases, statues, and fountains. The earlier prints of the seventeenth and early eighteenth century tell the story of the pomp of court etiquette and of parties of bewigged and brocade-clad ladies and gentlemen of the King's court. The parterres "decoupés" or "de broderie" and their variations show without words that the palaces or chateaux were occupied often in winter when design had to be marked by inanimate material, such as powdered brick dust, or different shades of gravel, relieved by neatly trimmed outlines in box and by punctuations of clipped yews rather than flower beds. It was as elaborate a world as can today be imagined and quite alien to our present way of life. Nevertheless, there are ideas to be gleaned in almost every print, whether the placing and surrounding of a short flight of stairs, or the adaptation of a formal or semi-formal design to a plot of ground irregular in outline and level. In the later prints of Rigaud, the solemnities and pomps of Silvestre and Perelle are simplified and made more elegant, but the details of the different French prints are full of ideas waiting to be translated to our day. It may be a mirror pool, or a fountain basin and its surrounding mouldings, or again the skilled use of the science of perspective even in tiny town gardens, and everywhere there is a rich fertility of design and composition. The Italian prints in the hall almost invariably show consummate art in the use of water, whether gushing and spouting fountains or rippling cascades from basin to basin on a hillside near the villa. Sometimes a quiet pool in front of a grotto or in a parterre was designed as a reflector of sky and clouds. The gayety of the running water and its refreshing sound of tinkles, gurgles, and splashes furnish a contrast to the sombre trees shadowing many a hillside and giving relief in the heat of an



Villa Lante—two casinos behind the fountain garden. Designed by Vignola, engraved by Pannini (1691-1764).

Entrance court of Chateau de St. Quen. Engraved by Rigaud (1659-1743).

Italian midsummer day. The Baroque fantasy, sometimes carried to a point of the ridiculous, or tricks of "Giouchi d'acqua," as they were called in the contemporary prints, are the points least commended at present. Guests were supposed to step unwarily on hidden springs, which set in motion jets of water on the astonished and doubtless frequently indignant visitor.

The quiet gardens depicted surrounding the manor houses and chateaux of Brabant are in abrupt contrast to the various phases of French and Italian garden design. The houses themselves show a more northern quality of reticence and aloofness and a desire for protection from a less gracious climate.

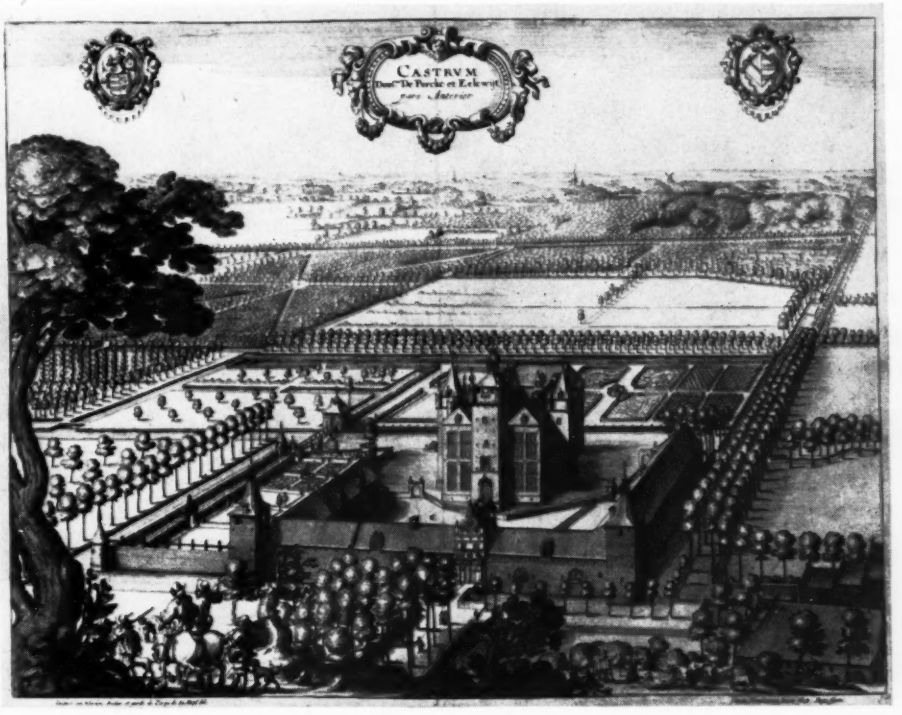
Again the total inaccuracy but gay colors of the "vues d'optiques" in the passageways depict scenes whether in India, Constantinople, Rome, Madrid, Paris, or London with the same high-heeled and hoop-skirted ladies and brocade-coated gentlemen. They cannot be regarded as trustworthy documents, but they do give a picture of a world as it appeared to the mind's eye of the draughtsmen of the period. The whole group of prints presents a history of western European gardening, such as may more laboriously be gleaned from volumes of garden history which abound in the reference library.

The casual visitor may not appreciate the educational usefulness of the prints, but anyone interested in human life as revealed in its surrounding frame can trace the development and almost the daily habits of those who used and enjoyed the gardens some hundreds of years ago.

A small group of the gardeners and designers of recent years are gathered in the Max Farrand Library—a photograph of the elder Frederick Law Olmsted, designer with Calvert Vaux of Central Park in New York, and Charles Sprague Sargent, who was the first director of the Arnold Arboretum and designed much of its planting and so taught garden lovers to use many previously neglected native American plants. The British gardeners, to whom we owe much of our knowledge and interest in grouping of herbaceous plants and hardy shrubs, are represented by a photograph of a portrait of Miss Gertrude Jekyll by William Nicholson, which shows the distinguished lady sitting in her room at Munstead Wood. This painting now is a part of the National Portrait Gallery in London, to which it was given by her friend, Sir E. Lutyens. The sensitive hands and thoughtful face show this leader of gardeners in her old age when sight was failing but not intelligence. There is also a photograph of William Robinson whose books, like those of his friend and contemporary, Miss Jekyll, awakened England to the long neglected beauty of hardy plants, rescued from cottage gardens where they had been pushed aside in the early nineteenth century passion for "carpet bedding."

No gardener can afford to overlook or neglect the study of these designers of the past. Even the most modern and functional designing can be helped by reviewing the achievements of the old time, whether of centuries past or more recent years, since all good garden art must be founded on the basic principles of the study of the site, climate, and fitness for its purpose.

The old saying is as true now as when it was first said or written, "What would be fair, must first be fit."



Chateau of Percke and Eelewijt — view of the approach and gardens. Engraved by Lucas Vorsterman Junr. (1578-1640).

The Bengal System of Hydroponics

By **J. W. E. H. Sholto Douglas**

Through the development of soilless cultivation in India, it is hoped to make all the large towns self-supporting in vegetables. The author suggests that this system of hydroponics may commend itself to the homemaker and to the commercial grower in America. Recently, the New York World-Telegram and Sun reported that Oriental bean sprouts are being grown in large quantity in "Chinatown" cellars under the hydroponics system.—The Editor.

IT WILL COME AS A SURPRISE to most persons to learn that India, although generally backward in the horticultural field, has actually captured the lead as far as soilless cultivation is concerned. The necessity for quickly increasing food production by all available means has resulted in the large-scale adoption of hydroponics at various centres throughout the sub-continent since it is about the only technique that promises rapid enough returns. To improve the soil of India, neglected and impoverished for so long, and to bring it up to a high standard, will take at least fifty years. Hydroponics, on the other hand, gives results within six months and maintains efficiency indefinitely. The immense possibilities of such methods were fully realized by the authorities in Bengal as long ago as 1945, and it was decided to initiate crop trials on one of the experiment stations. A Hydroponic Research Centre was set up at Kalimpong in the Darjeeling district, which lies in the Himalayan foothills at the extreme north of the Province.

One of the principal reasons for selecting a site at Kalimpong for the first experiments in soilless cultivation is the unique combination of climate of the area in which the town is situated. Most tropical, sub-tropical, and temperate zone crops can be grown there, with the exception of certain fruits such as apples. The Government of West Bengal has maintained a demonstration farm at Kalimpong for about forty years. During the last war valuable work was undertaken at this station in connection with the cultivation of flax and pyrethrum flowers. The latter yield an insecticide of considerable strength, and it was found that the quality of the plants raised in the Himalayas exceeds those produced in Kenya where up till then the greater quantity of pyrethrum crops was grown.

Extremes of temperatures are unknown in the district; the maximum seldom exceeds 82°, while the minimum is about 45°. The southeast monsoon arrives about the middle of June and lasts until September. During this period the weather is dull and cloudy, with the heaviest rains falling in July, when totals of up to thirty-five inches have been recorded. But by October the skies are blue again, and for the next six months a kind of perpetual English summer reigns. Hosts of delightful flowers spring up. This is the best time for growing all European vegetables; large quantities were dispatched for sale in Calcutta before the railway line to that city was closed following the partition of Bengal between India and Pakistan. Citrus fruits (mainly oranges) apricots, and peaches are abundant, while in the lower valleys there are big pineapple gardens. The basic field crops are rice and maize.

The experiments in soilless culture of plants at the Government of West Bengal's Experimental Farm in Kalimpong had as the objective the development of a system of hydroponics suitable for Indian conditions. Hydroponics means "water working"—the word is derived from the Greek—as opposed to geoponics or agriculture, "care of the earth." Instead of the plants drawing their nourishment from the soil, they are fed on chemical solutions of fertilizer grade salts containing all the elements necessary for healthy crop growth. By using such a method bigger and better yields are obtained, costs are lower, and cultivation may be carried on in barren or desert areas or in towns where conventional systems of soil gardening are impossible. But although soilless culture had been known and used for many years, the technique that had been practised in Britain and the United States was often most complicated, needing elaborate apparatus and equipment, and so useless for adoption by the public in India. A novel system, of which practicability and simplicity must be the keynotes, would have to be introduced if hydroponics were to succeed in Bengal or, in fact,

A hydroponic bed in West Bengal — the framework supports water in hot weather and rainy seasons, and cloches in winter.

ever to prove of any value to the people of Asia. One of the first problems to be faced was that of the Oriental monsoon, which would upset the controlled exactitude of all known methods. Techniques with impressive records of achievement in America had failed miserably when tried under European conditions. Ingenuity and improvisation were called for. After a year's work it was possible to publish the first results. These indicated amazing success, and the new method was offered to the public as the Bengal system, inexpensive to install, simple to maintain, and economical to operate. Extension of the research studies from Kalimpong to other areas followed quickly, and hydroponicums were opened at Madras, Calcutta, Bombay, and in many other parts of India and adjacent countries. Naturally, experiments still continue, for much remains to be done. There will be modifications and adaptations as further trials reveal ways for improvement.

At the present time there are about a thousand hydroponic installations in various districts of India, excluding the numerous small troughs kept by housewives. The object is to extend the technique until all the large towns have been made self-supporting in vegetables. Tons of nourishing green-stuff can be grown on rooftops, in backyards, on verandahs—anywhere that light and water can be made available in sufficient quantity. If adequate amounts of vegetables could be produced hydroponically by soilless culture to feed the urban areas, then the available fertile agricultural country land could concentrate on cereal growing. There might be some hope, in such an event, of keeping pace with the rapid increase of population. The last census revealed that India's inhabitants will total over five hundred and twenty million by 1990—a rise of over five million more yearly. Unfortunately, no corresponding increase in crop yields occurs. Hydroponics is, therefore, the country's only prospect of coping with this colossal problem, unless famine is to be permitted.

Plants are grown in troughs constructed from any suitable material such as wood, bricks or stones, asphalt mats, or mud plaster, and filled to a depth of eight inches with a coarse mineral aggregate, preferably a mixture of five parts rock chippings, gravel or cinders of five-eights to one quarter inch grade, and two parts of sand or rock dust. The bottom of the bed is made to slope slightly, and around the side walls gutters are fitted to carry off surplus solution and water that seeps through the drainage holes. Irrigation is provided by inlet pipes, though at certain times the natural rainfall will be sufficient in out-of-door hydroponicums. Care has to be taken to ensure that the growing medium is not kept too wet—this would kill the plants by suffocating them. The aggregate should be as moist as a damp sponge just lightly wrung out. Aeration is essential, for crops need oxygen to live. Little is required in the way of further equipment, except a hose for conveying water and a few tools such as forks and rakes. A stirrup pump is used for washing down the salts, as will be explained later. Overhead shading is excellent in hot areas, and it also checks excessive evaporation from the beds.

Nutrient salts or chemicals are applied dry in a stipulated ratio to the area of the trough once a week or ten days, by sprinkling them evenly between crop rows, and then immediately washing them in with a light spray of water. Balanced formulae containing all the elements needed for healthy plant growth have been worked out. These consist of mixtures of fertilizers such as sodium nitrate, ammonium sulphate, calcium and magnesium sulphates, potash salts, and superphosphate. Certain trace chemicals are also required. In practice all these are found in the salts of the main mixture. We know that the green plant uses upwards of thirty elements for growth. the most important being nitrogen, potassium, phosphorus, magnesium and calcium, iron, sulphur, and manganese. In addition, the plant gets carbon from the air. Recently, for the convenience of the non-technical operator, the fertilizer salt mixtures have been made up into tablet form. These tablets are merely inserted in the growing medium at the rate used with the powders—one and a half to two ounces to the square yard of trough space. Several hundred different formulae have been proposed for the purpose of soilless cultivation of plants, but the actual choice of fertilizer salts is immaterial, provided all the necessary elements are present. Adjustments are made for different types of water and aggregate.

Sweet corn, grown by soilless culture, in Bengal.

Tomatoes intercropped with lettuce are raised by the Bengal system of hydroponics.

The soilless culturist is not, of course, expected to work out these details alone; it is only necessary for him to submit all revelant particulars to the nearest research centre or other institution specializing in hydroponics. A properly balanced nutrient formula for application as plant food can then be supplied, the prescription for which will have been made up by experts. As examples of the type of mixtures used, the analysis of the compounds employed

(Continued on page 126)

LANDSCAPING YOUR OWN HOME

By Alice L. Dustan

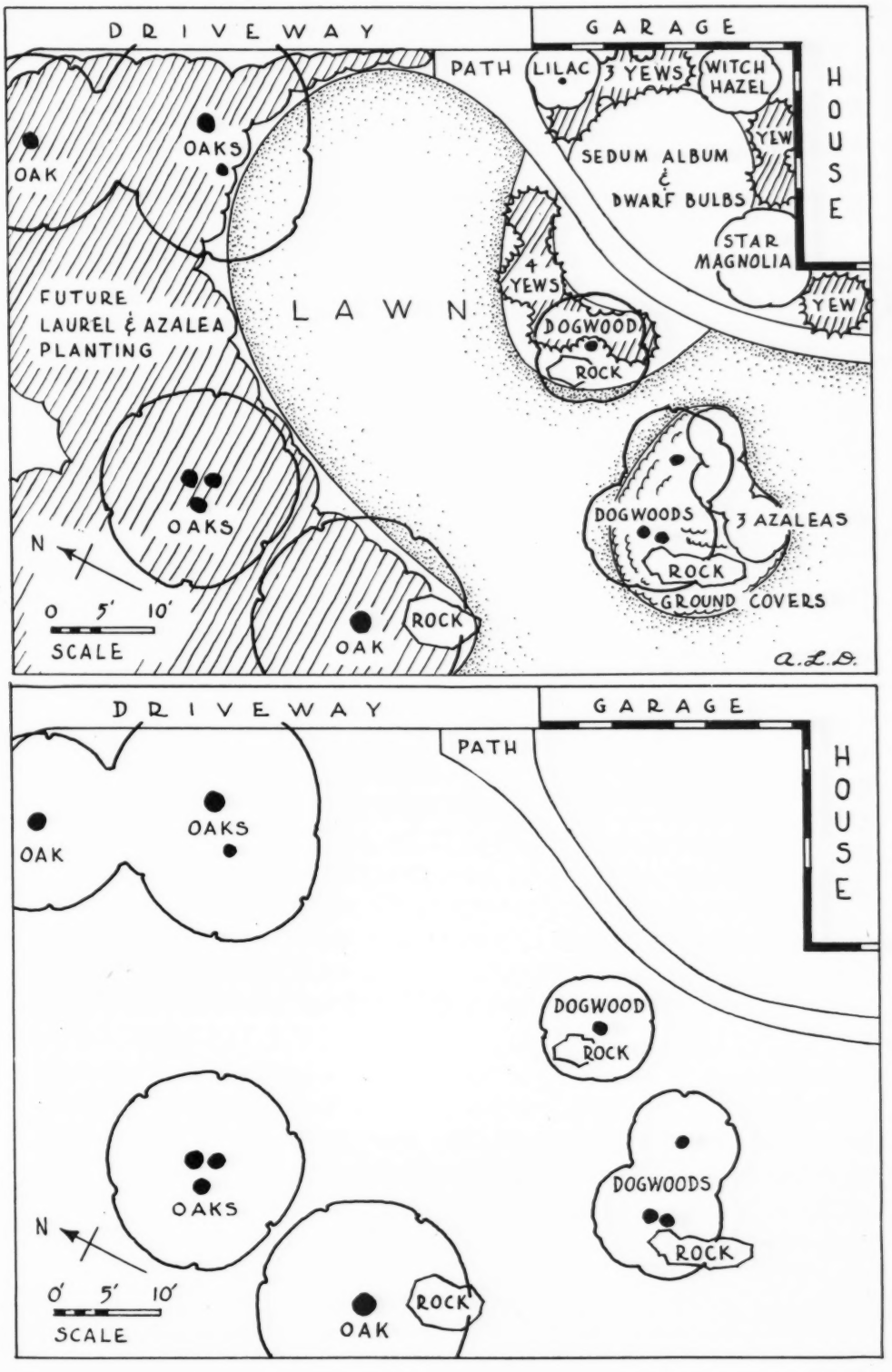
The text, the photographs by Gottscho-Schleisner, and the plans drawn by Henry H. Wiss, Associate Professor of Architecture at the Virginia Polytechnic Institute, are from the new book, *Landscaping Your Own Home*, published by Macmillan Company, May 1955, and reprinted in these pages with permission of the author, Alice L. Dustan, and the publisher. This book, chosen by The American Garden Guild as its July selection, presents a clear explanation of the various aspects of home landscaping and includes plans that are appropriate for homes of traditional and of contemporary design.—The Editor.

NATURAL FEATURES GUIDE PLANTING

Upper, existing dogwoods and rocks are accented by low evergreens and groundcovers. Evergreens are repeated in foundation planting, accented with structural shrubs. Lower, before planting.

VARIETY IN GROUNDCOVERS

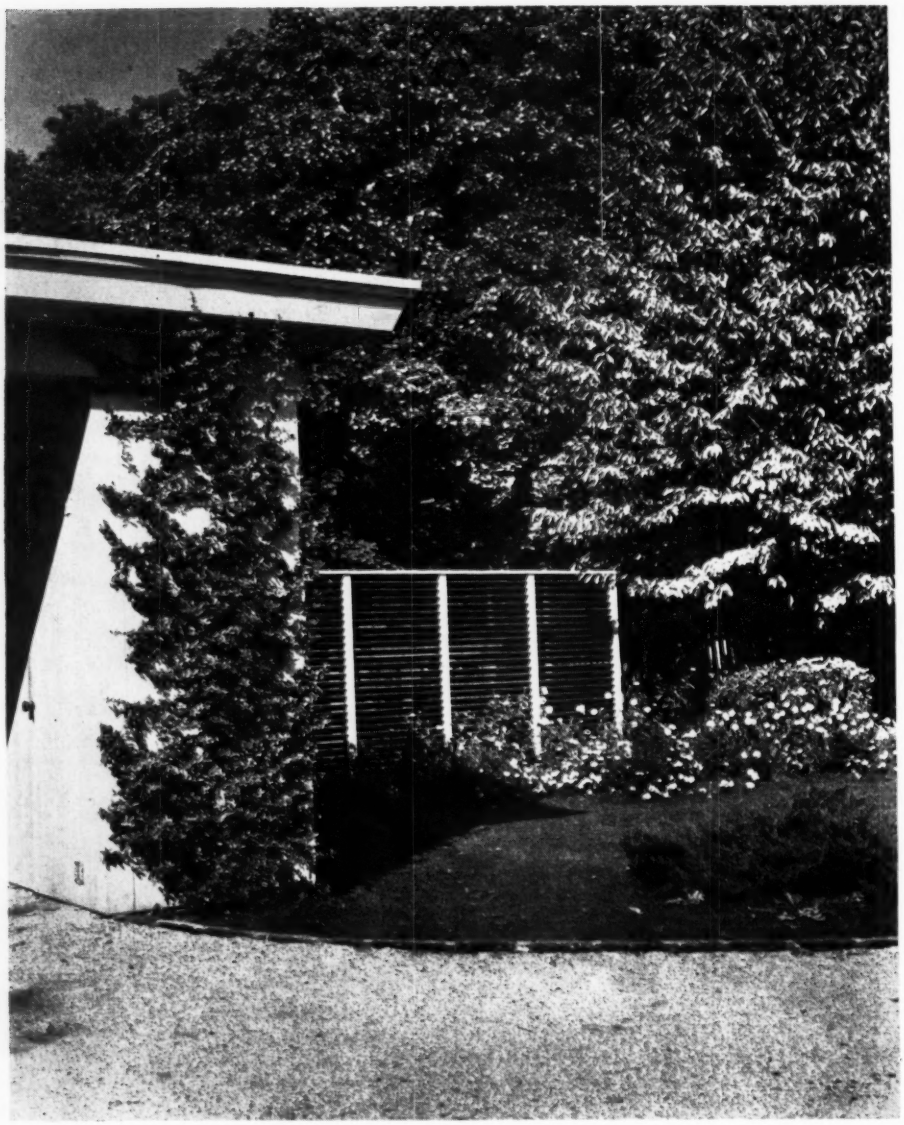
Silvery-leaved lamb's ear, dwarf iris in front of a gray rock; bleeding heart, columbine, and azalea behind.



PLAN FOR A CORNER OF GROUNDS IN ROCKY, SLOPING TERRAIN WITH EXISTING DOGWOODS AND OAKS

The natural terrain has been preserved and played up. Tree and rock groupings have become oases of low plantings. Contours of the site have been carried out in sweeping curves of beds and walk. The grove of oaks, at the outskirts, will later be planted with laurel, azaleas and other acid-soil shrubs, carpeted with groundcovers and bulbs.

Foundation planting repeats the evergreens used to supplement rocks and trees. The dwarf yews, obtusum azaleas, and Japanese hollies fit the low-foundationed house. Single specimens of star magnolia, Chinese witch-hazel, and lilac accent corners and give bloom succession. A carpet of *Sedum album*, in el of house and garage, has been interplanted with dwarf spring bulbs to enjoy from indoors. Owners are planting all bulbs and groundcovers themselves. The bottom sketch shows the property before planning or planting.

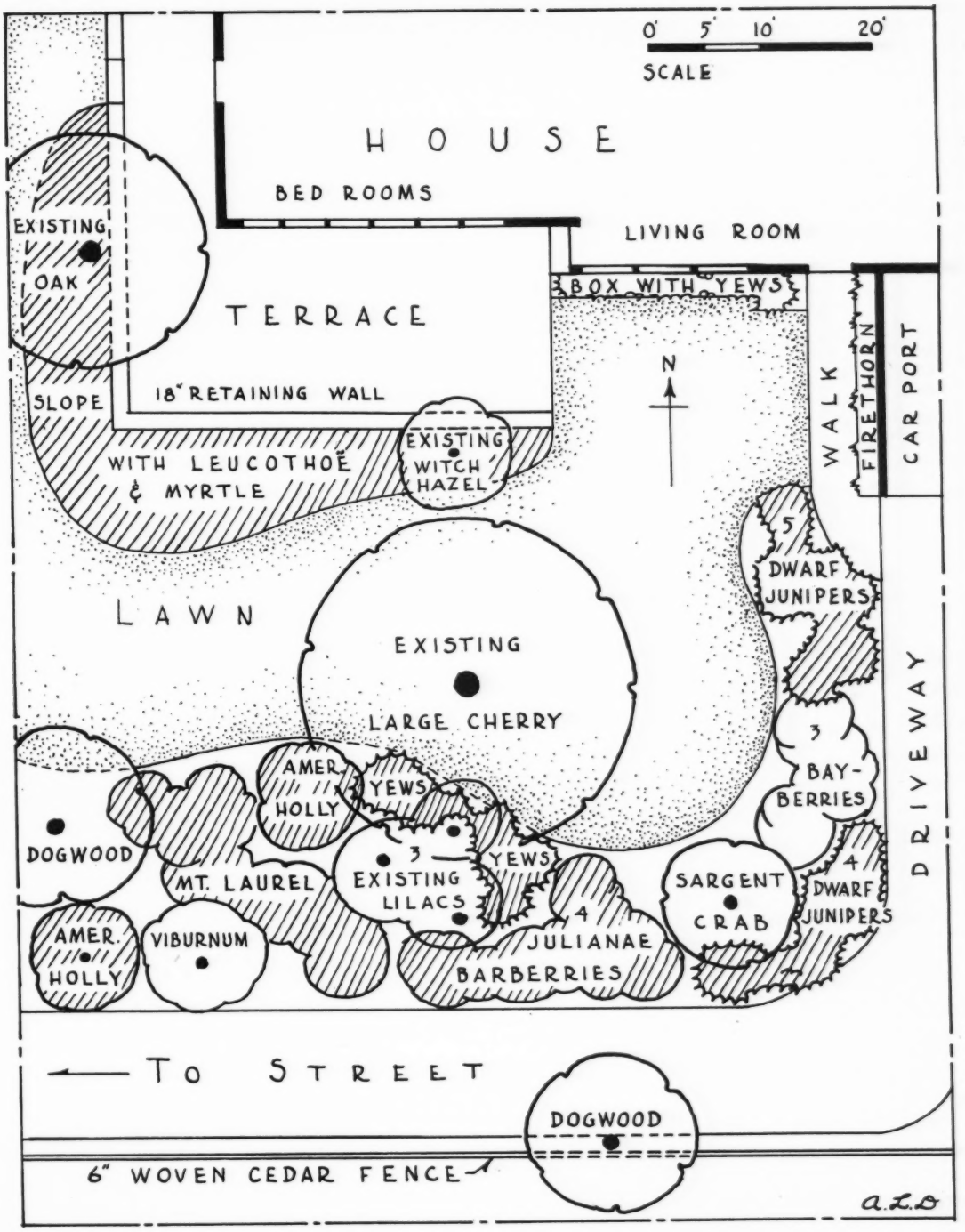


A FENCE TO ALLOW AIR-FLOW

Section of owner-designed louvered fencing hides laundry from house front. Orange-fruited firethorn grows flat against the corner of the garage.

PLANTING FOR A LOW HOUSE

Left, boxes with dwarf evergreens substitute for foundation planting in a contemporary house. Dwarf junipers and bayberries thrive along the sunny driveway. Right, before planting.



PLAN FOR THE SOUTH SIDE OF A CONTEMPORARY HOUSE TO DEVELOP A VIEW FROM WINDOW WALL

Plantings beside the house have been kept low to preserve an open view. Dwarf conifers fill built-in plant box; leucothoe and myrtle cover shaded bank along terrace edge. The open lawn in front gives quite a spacious effect for a small lot. What would be foundation planting in an old-style house has been pushed out beside the driveway. Starting with dwarf junipers and bayberry nearest the carport, evergreen shrubs gradually build up in height. The owners keep a thick mulch of oak leaves under all shrubs to lessen the chore of weeding new beds.

Screening at property edge, to block out neighboring house, has been worked out with a combination of solid six-foot fencing and tall deciduous planting. Dogwoods, crab apple, and viburnum supplement the existing cherry tree, lilacs, and witch-hazel. This combination, underplanted with the evergreen shrubs, has proved to be enjoyable at all seasons, viewed through the living-room window wall.

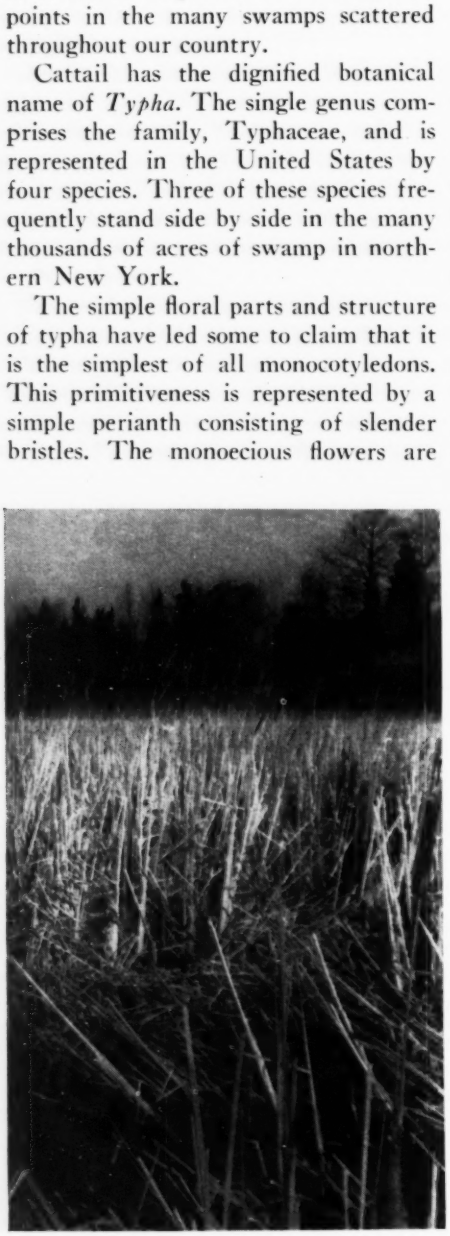
THE CATTAIL STORY

By Leland C. Marsh

CATTAIL IS A HOMELY WORD, suggesting a bit of the commonplace and the taken-for-granted idea in things that we see around us daily. We may call it bulrush, reed mace, tule, flag, reed, rush or cat o'nine tails. Whatever the name, most of us recognize this plant with its long sword-shaped leaves terminated by brown cylindrical heads, as it stands on parade-like exclamation points in the many swamps scattered throughout our country.

Cattail has the dignified botanical name of *Typha*. The single genus comprises the family, Typhaceae, and is represented in the United States by four species. Three of these species frequently stand side by side in the many thousands of acres of swamp in northern New York.

The simple floral parts and structure of typha have led some to claim that it is the simplest of all monocotyledons. This primitiveness is represented by a simple perianth consisting of slender bristles. The monoecious flowers are densely crowded in a terminal spike. One of these spikes may contain as many as five hundred thousand fertile seeds or nutlets intermixed with copious down. The simple, jointless stems are tightly enclosed by leaf sheaths which transist into the long sword-shaped leaf blades. The underground system consists of abundant anastomosing rhizomes which account for the gregariousness of the plant.



Marshland filled with *Typha glauca*, reproductive and non-reproductive.

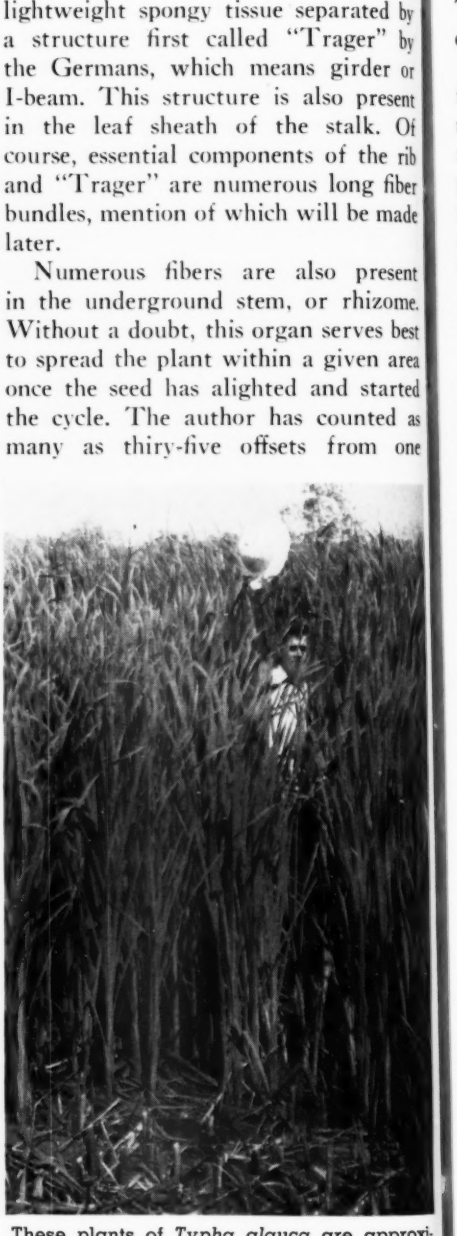
A closer examination of each of these structures is important to an understanding of the immense success of cattail and of some of its uses:

The spike ranges in thickness from six-tenths to one inch and in length from three to ten inches. It is a remarkable engineering structure in which several million fibers are packed in a close orderly arrangement. The fibers are less than half an inch long and occur in clusters consisting of thirty to sixty fibers. Centrally located in this cluster is the tiny seed less than two hundredths of an inch long. When each cluster leaves the spike, it opens up like an umbrella. This parachute, with the seed as its passenger, is carried over great distances by air currents. This air buoyancy is not easily overcome because of a water-proof coating of the seed hair which prevents early wetting down.

The leaves and sheaths are also water-proofed which prevents an undue loss of water. At first this may seem to be a useless advantage, since the plant grows in an abundance of water. Actually certain species grow in highly saline soils where undue transpiration would result in the uptake of deleterious amounts of salt. Secondly, even though Typha is a paludal plant, it can withstand considerable periods of desiccation.

Another amazing characteristic of the leaf is its ability to withstand innumerable stresses and tensions. Imagine a leaf over one hundred times longer than wide and five hundred times longer than thick withstanding near hurricane winds without damage! In some stands the entire aerial plant is vegetative and has no stem tissue. These plants may attain a height of fifteen feet. When winds sweep across such a cattail stand, the slender green leaves twist and bend but they rarely break. This amazing strength represents another marvel of nature's engineering. A cross section of the leaf reveals the secret. The leaf is shaped like an airplane wing with longitudinal ribs and many compartments each filled with a lightweight spongy tissue separated by a structure first called "Trager" by the Germans, which means girder or I-beam. This structure is also present in the leaf sheath of the stalk. Of course, essential components of the rib and "Trager" are numerous long fiber bundles, mention of which will be made later.

Numerous fibers are also present in the underground stem, or rhizome. Without a doubt, this organ serves best to spread the plant within a given area once the seed has alighted and started the cycle. The author has counted as many as thiry-five offsets from one



These plants of *Typha glauca* are approximately half as tall as they will be at maturity.

Twenty-four inch stalks of *Typha glauca* are used to caulk the heads of wooden barrels.

mother plant in one growing season. It has been said that as many as three acres of cattail may consist of one plant with one continuous underground system of rhizomes. The author has suggested that a vigorous stand of *Typha glauca* consists of sixty-two thousand to eighty-six thousand plants per acre.

Studies have shown that even though the cattail is perennial, the rhizomes rarely persist more than two years and usually not longer than one year. In other words, the cattail stand represents approximately an annual yield. This accounts for the important role of cattail in the deposit of muck soil.

The new plant arises each spring from the rhizome bud and receives its nutrients from the rhizome. The rhizome contains approximately eighty-one percent carbohydrate and forty to sixty percent starch. If it were not for this abundant reservoir of food, the young bud could not grow through several feet of standing water which sometimes inundates the stand.

Finally, in our closer examination of the structures of the plant, mention should be made of a tissue present in the leaf blade, leaf sheath, and rhizome. This tissue is spongy and is properly called aerenchyma, meaning air tissue. By means of this tissue air can be stored and used in periods of anaerobic respiration. This accounts in part for successful growth in inundated areas.

Having now completed an examination of the structures of the plant, it is easier to understand its success. This success is represented by the distribution of cattail. Typha is abundant in temperate, tropical, and subtropical climates. The plant is known in Alaska, Canada, United States, Mexico, and throughout South America. It is extensive in Europe and found in abundance in Russia, Africa, China and Japan. In short, typha enjoys universal distribution. The plant is well represented in New York State. For example, one area near Montezuma of approximately thirty square miles is dominated by typha. An estimate of the swamp land in the United States has been set at one hundred and forty thousand square miles, much of which is dominated by typha.

It is to be expected that such universality should have favored exploitation. Indeed, cattail has a long history of uses. Surprisingly, however, most of these exploitations have been informal and at a handicraft level. To the best of his efforts the author has not been able to find more than one hundred and forty-nine references to typha in the literature, and this includes technical and non-technical literature.

Perhaps the earliest mention of cattail was in the Old Testament where the Baby Moses was placed in the bulrushes. The earliest use of cattail probably was the ancient Egyptian custom of weaving mats from the leaves. This practice still exists today. The leaves are woven by hand into beautifully decorated mats and carpets which constitute a common fabric used, for example, as prayer rugs, floor and wall coverings. The American Indian used similar mats in his dwelling. The strong leaves were used as cordage. Even today several large companies manufacture chair sets from the twisted leaves. These seats are called rush seats. The Indian employed the leaf and leaf sheath as a caulking material. Curiously enough, even today nearly all watertight wooden barrels are caulked with the leaf sheath of *Typha glauca.*

Another ancient Egyptian practice passed down to the present is the use of cattail to clarify certain areas of the Nile delta of salt. Typically, a large log or plank is drawn by animal through the area to be planted. Several boys ride the plank to which is attached

(Continued on page 128)

TRUCK GARDENING IN THE ATOMIC AGE

By **Bernard L. Lewis**

A field worker places a box of grapes on to a palette resting on a road in one of California's rich vineyards. This steel framework will be mechanically placed on a truck and rushed to a cooling room where field heat will be removed before being shipped to market in "reefers."

IT IS WITHIN THE MEMORY of those who live in the populous northern areas of the United States, that the fresh fruit and vegetable counters of food stores were almost empty during winter months. Other seasons, shipments of fresh fruits or vegetables were heralded by special announcements. Most fresh fruits and vegetables were grown close to their markets, and out-of-season produce was available only to the well-to-do.

Today, at least fifty fresh fruits and vegetables are available every month of the year in almost every hamlet in America.

The full story behind this rapid change is enormously complicated. Yet it can be simplified by saying that it is due to improvements in growing, handling, transporting, storing, and selling.

Refrigeration is the big word in shipping and storing produce. The first shipment of fresh fruit under refrigeration was made in 1866, when two hundred quart boxes of strawberries were shipped a few hundred miles in a specially-built crate containing one hundred pounds of ice. Today, there are more than one hundred thousand refrigerator cars, thousands of refrigerated trucks, and hundreds of refrigerated boats hauling produce daily to American markets.

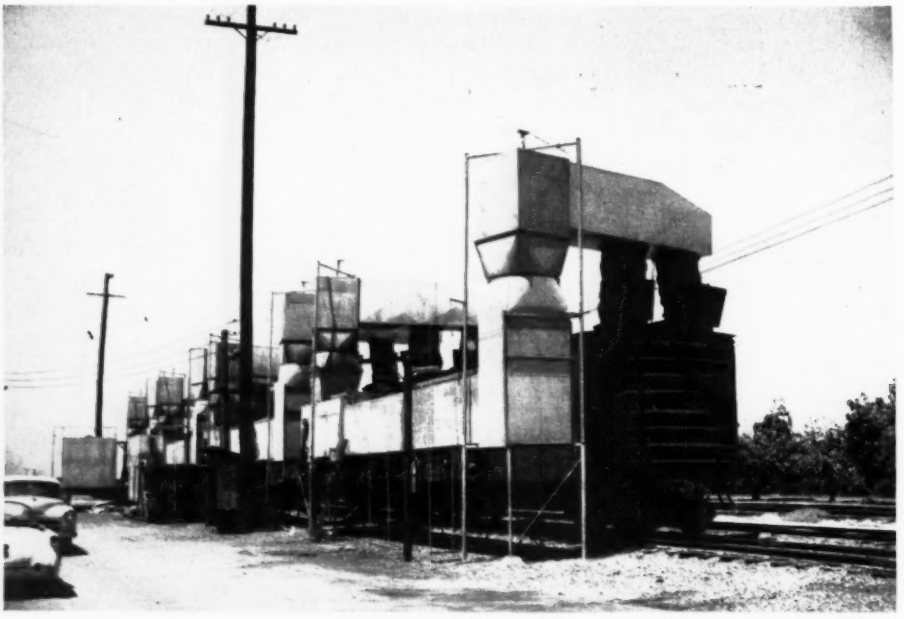
VEGETABLES

Before fresh vegetables are tucked into refrigerator cars for the journey to market, they usually feel the beneficial effects of low temperatures. The pre-cooling operation is designed to remove field heat from the vegetables in order to prolong their market life. Pre-cooling has generally consisted of running the vegetables through a cold-water bath or spray. The newest, fastest, and most exciting form of pre-cooling is that of vacuum cooling.

Pre-cooling of vegetables actually begins with a harvesting operation geared for amazing coordination and speed.

Let's take lettuce as an example. Harvesting machines are used that are literally packing sheds on wheels. Crews up to seventy workers man these mammoth devices which inch along the fields, spanning up to two dozen rows at a time. Workers pick the lettuce, trim it, and place the heads on conveyor belts. On top of the machine, the crates or corrugated boxes are made and fed by conveyor belts to the point where the washed lettuce emerges. The boxes are skillfully packed, stapled, and loaded on trucks which move alongside the machine. As soon as the truck is loaded, it speeds away from the field, and a new one takes its place.

Much of the carton-packed lettuce moves to a vacuum-cooling plant. Here



Refrigerator cars are being "pre-cooled" by immense units before they receive loads of grapes for the journey to market.

the entire load may be removed at one time by a giant fork-lift and placed on a miniature train, whose tracks lead into the vacuum-cooling tube. The door of the tube closes, the air is pumped out, and in fifteen minutes the temperature of the lettuce is reduced to the optimum for transportation to the market. From the vacuum-cooling plant, the load goes into a pre-cooled refrigerator car which is waiting on a siding.

One vacuum-cooling plant in Salinas, California, and one in Tolleson, Arizona, handle an entire refrigerator car at a time. More of these large plants are in the planning stage.

FRUITS

In the harvesting of fruits the focus is also on harvesting speed, followed by removal of field heat in pre-cooled storage rooms or in refrigerated cars with fans or car pre-coolers.

All steps of the harvesting operation mesh like clockwork. In many instances the packing shed has its own radio station, with transmitter-receivers in trucks and cars. Fork-lifts buzz around like busy bees, loading crates or boxes or a ton or more, many times faster than hand-loading. Conveyor belts are standard equipment in every step of the harvesting and packing operation.

For example, to avoid handling and to increase speed, grapes are frequently packed in their shipping boxes as soon as they are picked. Full boxes are loaded in a steel palette, or rack, fork-lifts load them on trucks, and they are quickly moved to cooling rooms, or into pre-cooled refrigerator cars. The entire process is carefully coordinated, and vineyards being harvested resemble Main Street during rush hour.

A trailer load of boxed apples is hauled from a typical orchard—immediate destination is the packing shed where the apples will be graded and packed.

Where sizing or grading of fruits is necessary, as in the case of citrus, peaches, apples, plums, apricots, etc., packing houses predominate. These are no longer wooden sheds in the backyard of a ranch. They are usually large, mechanized operations, with equipment as carefully engineered as that in any manufacturing plant, and costing many thousands of dollars. Top quality goes to "fancy pack," or fresh outlets, and the rest is channeled to a processing operation. In some cases fruit is automatically packed.

WINTER PRODUCTION

Filling the fresh fruit and vegetable departments of retail stores with healthful fresh produce during winter months has largely been a triumph of growers. Former seasonal boundaries have been pushed aside as growers have developed winter commercial production in semi-tropical areas. Fresh corn is now available in winter in most large food stores. Some growers produce melons most of the year by owning or leasing fields starting in Texas, working up through California desert areas, then to Arizona, and ending in the Brentwood and Marysville area of California's Sacramento Valley. Almost every common vegetable is now produced during the winter in Florida, Texas, Arizona, and California.

Modern storage methods are equally important in extending seasons. Because of cold storage, pears which are har-

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Workers at the left are placing just-harvested celery on conveyor belts. The stalks are washed and trimmed in the housing (center) and emerge seconds later for packing. In the meantime, workers above make the cartons. In the background a truck follows and speeds to the vacuum-cooling plant the moment it is loaded.

SO YOU WANT TO GROW AFRICAN VIOLETS

By Ruth Marie Peters

To take cuttings leaves are cut off with a razor blade or sharp knife. The end is allowed to dry for an hour or two until a callus forms.

THE LITTLE USAMBARA VIOLET has conquered the world. Now it is deeply entrenched on window sills, in greenhouses, and under artificial light units everywhere. Since its discovery in eastern tropical Africa more than fifty years ago, *Saintpaulia ionantha* has had a rapid rise to fame.

When Baron Walter von Saint Paul first found the African violet, its single purple flowers gave little hint of its future wide and varied career. Since then, hybridizers have developed hundreds of varieties with foliage and flowers so different from the original that it is difficult to believe they came from the plants found only five decades ago. Now the colors of blossoms, forms of plants, foliage, and flowers are so numerous that keeping track of all the varieties has become a difficult task. The latest introductions no longer resemble violets—rather they look like little pink roses, and breeders are talking about trying for deeper shades verging on raspberry to add to the color range now available — white, blue shades, purple-reds, pinks, and bi-colors.

Several other species of this little gesneriad have also been found. Some are rosette types like *S. ionantha,* but *S. grotei* and *S. magungensis* have creeping or trailing stems—perhaps a basis for more cascade African violets of the future.

No plant is easier to grow in our modern homes where rooms are heated or cooled with thermostatically controlled equipment. Requirements of light, moisture, and temperature are modest—average light, medium watering, and a daytime temperature of 65° to 70° with a ten-degree drop at night. If temperatures are slightly higher, the plants won't mind as long as the humidity is increased too. Electric humidifiers are available for this purpose; and if plants are set on pebble-filled trays of water, moisture will be added to the air through evaporation.

In summer, temperatures often go too high, and African violets taper off on blossom production to show their resentment. But when cooler fall days arrive, they resume flowering, although sometimes these early flowers will be streaked with white.

Any exposure in the house is suitable for your saintpaulias, but in over-sunny east, south, or west windows during summer, a light net curtain should be used to filter the sun. If this is not done, foliage will turn pale green. A screen on the window will serve the same purpose.

African violets are ideal for growing under fluorescent lights. They all reach about the same height, so light adjustment over them is a simple matter. Usually, the best distance is about a foot from the tops of the plants. Simple fluorescent-light fixtures of the industrial type, with reflectors and two 40-watt daylight tubes will provide a satisfactory set-up. White cardboard alongside the plants, or whitewashed walls in a basement or coal-bin, will increase light reflection. A time switch makes it easy to regulate the light to a fourteen-hour span daily, which most growers find produces maximum bloom.

Watering should be done carefully so that the plants are never too wet nor so dry that small buds just forming dry up before they develop. Over-dry soil and inadequate light are probably the two main reasons for lack of bloom.

Cuttings are placed in a pot of vermiculite or sand, which is kept evenly moist. Cuttings can also be placed in a glass of water, by punching holes in wax paper and securing the paper over the glass with a rubber band.

In the small pot, foreground, a plantlet is growing on a leaf cutting. The other cuttings in a community pot are ready for transplanting.

Water when the surface of the soil begins to feel dry to your fingertips, and use water of room temperature or slightly above. If leaves should be moistened during watering, set the plant in the shade until they dry or the foliage will become splotched and streaked with white or yellow spots. Often, leaves too close to the window pane will become moistened with condensation on the glass, and gardeners find it puzzling that, although they carefully avoid wetting the leaves when watering, their plants still become discolored. Watering can be done either from the top of the pot or from the saucer. When watering from the top, be sure that the spout of the watering can is placed below the leaves. Wick-fed containers are good, too, if the soil is allowed to dry out a little before the reservoir is refilled.

Once a month is often enough to feed African violets. Liquid plant food, diluted according to manufacturer's directions, is the easiest method for me. Whenever growth seems to stand still, as in summer when temperatures rise too high, feeding can be skipped until growth is noticeable. Fertilizer salts often are visible on the soil surface—especially in pots that are consistently watered from below. In such cases, water several times from the top of the pot to wash salts away.

To clean any dust from the hairy foliage, use a soft camel's hair brush, about three-quarters of an inch wide. Gently brush off each leaf, holding it with your hand, and stroke the brush in the direction in which the hairs grow —from the broad part of the leaf to the tip.

Large exhibition plants of two-foot girth can be grown by proper pruning of side shoots so that each plant has only one crown. Guide the leaves that radiate from the plant in all directions in the way they should grow by placing toothpicks or match sticks in the soil as supports. Some varieties which can be used for training and for development of exhibition plants are 'Violet Beauty,' 'Admiral,' and 'Blue Eyes.'

Multiple-crown plants can be divided to increase your stock, but if they are growing well and blooming prolifically, wait until flowers taper off. Then cut the crowns apart carefully, taking each with a few roots. Cut ends should be exposed to the air for an hour or two until a callous forms. Then each plant can be potted individually. If there are pieces without roots, place them in damp vermiculite, sand or sphagnum moss until these form.

Mature plants usually indicate a need for repotting when growth slows up and pots become overcrowded with roots. I find annual repotting a good idea, since the soil—light and porous though it is to begin with—often packs down from numerous waterings. For small-sized varieties four-and-a-half-inch pots will be adequate, but some large varieties will be better off in six-inch pots. Any type of container is suitable, no matter what the material or whether it has a drainage hole. The important thing is to suit the amount

Large plants may be divided so each has a single crown. Annual repotting of mature plants is sometimes necessary.

Small shoots can be removed from sides of mature plants and rooted in sand or vermiculite; they will flower in four to six months.

of water to the pot porosity. A plant in a non-porous pot will not need to be watered as often as one in a porous container.

For potting soil I use equal parts sand, peatmoss, leafmold, and vermiculite. No fertilizer is added to the potting soil—the monthly liquid feeding takes care of nourishment needs.

Several pests trouble African violets occasionally, and these may be recognized by their symptoms or by the appearance of the insects themselves. Mites cause hard, twisted leaf growth at the plant center. One treatment is to use sodium selenate (a poison) which is available in capsule form for inserting into the soil. The plant absorbs the poison, and the insects are killed when they feed on the plant.

Small, cottony-white insects can sometimes be seen on foliage or leaf axils. These are mealy bugs. Clear them up by touching each bug with a cotton-tipped toothpick dipped in alcohol, but keep the alcohol off foliage.

If leaves are dull and turn down at the edges, root-knot nematodes are usually the cause. The best thing to do is discard plants that are affected. Sometimes uninfected plants will result by rooting a leaf from an infected plant. For this, choose leaves that are growing upright and have not come in contact with the soil. Some nematodes can move about only in water, so leaves should be kept dry to keep them from spreading. Avoid contamination from the soil of an infected plant—discard this and sterilize the pot by boiling it or dipping it in a Lysol solution.

When an entire plant suddenly wilts, crown rot is usually the cause. This often occurs when plants are overwatered. An infected plant can sometimes be saved by cutting off the top above the rotted root and starting it as a new cutting.

Minute white "worms" which hop about on top of the soil or in the saucer, when a plant is watered, are springtails. They are not harmful, but if they are a nuisance a teaspoonful of Lysol in a quart of water can be used to wash them from the soil. Many of them can be eliminated at once by dumping the water from the saucer down the drain.

African violets are among the easiest plants to propagate. Leaf cuttings taken with an inch of stem can be inserted in damp sand, vermiculite, or sphagnum moss, or suspended in a glass of water through holes punched in wax paper placed over the top of the glass with a rubber band. Roots will form in about two or three weeks and small plantlets will appear shortly thereafter. As soon as these grow large enough to be handled comfortably, they can be potted up in two-inch pots, either dividing the numerous plantlets at the end of each stem, or planting them as they are for multiple-crown plants.

Seeds of African violets germinate in about a month, if sown carefully on the surface of a mixture of leafmold and sand, or on vermiculite, or other suitable methods. To keep the tiny seeds from drying out, cover the container with a pane of glass.

Seed pods often form on plants without any aid on the part of the gardener. But for selective breeding a slim paintbrush can be used to transfer the pollen, from a yellow pollen case slit with a razor, to the stigma of the flower chosen for seed production. Few seedlings show any promise of superiority over the varieties now in commerce, but African violet hybridizing is interesting, and many members of the African Violet Society of America find it a fascinating hobby.

Avoid wetting foliage when watering and feeding African violets.

Remedies for . . .

PLANT NUTRIENT DEFICIENCIES

By W. J. Hanna

THE FIRST STEP in remedial action is correct diagnosis, unless the "hit or miss" method is to be used. Diagnosis should include as complete a survey of the situation as possible in order to differentiate between nutrient deficiencies and other factors which cause poor plant growth. Nutrient deficiencies may easily be confused with certain diseases, insect damage, poor physical condition of the soil, or even adverse effects of weather. Careful inspection of the plant and the soil in which it is grown may yield enough information on which to base the diagnosis. If there is no positive proof of the presence of disease or insect damage and there has been no unseasonable weather, we can concentrate our attention on the soil.

Every gardener should know the subsurface characteristics of his soil in order to grow plants successfully. This knowledge can only be gained by digging into the soil and making careful observation of the physical nature of the sub-surface soil. This does not require a separate operation since the observations can be made when the soil is being prepared for planting. The gardener should be especially watchful for various foreign material which may have been left in the soil during construction of the home and subsequent grading. Such objects as waste building materials, including lime, mortar, and large masses of cement, are often found in the foundation area. The gardener should also observe the soil itself, noting the relative amounts of sand, silt, and clay, as well as the presence of any layers of soil different from that above and below. Sandy soils or sandy layers will not hold much water or nutrients so that droughtiness and nutrient deficiencies, especially of nitrogen, should be expected. Clayey soils or clay layers will tend to be wet with impeded movement of water and air resulting in restricted root growth.

If the diagnosis of poor plant growth on a soil does not reveal evidence of disease, insects, or physical soil conditions as the cause, then we can be fairly certain the trouble is nutritional. This assumption can usually be substantiated by chemical analysis or testing of the soil and of the plant. In recent years rapid chemical tests have been devised to evaluate the supply of nutrients in soils. Soil testing is done by most of the state agricultural colleges, by many county agricultural agents, consulting laboratories, fertilizer companies, and garden supply houses. There are also a number of kits available for the home gardener to make his own tests. Many of these chemical kits, while simple to use, are quite sensitive and unless extreme caution for cleanliness is observed may yield the wrong answers because of contamination or deterioration of reagents. Where considerable expense is involved in applying the remedies indicated by the test, it is recommended that the test be made by reliable laboratories.

After considerable discussion we have reached a point where, either by chemical tests or observation, we have made a diagnosis indicating a nutrient deficiency. It should have been obvious during this discussion that the old saying, "an ounce of prevention is worth more than a pound of remedy," would be true in the case of soil nutrient deficiencies. The second step in remedying nutrient deficiencies should be preventive action before trouble occurs. This is possible if the first step of diagnosis is carried out before or during the preparation of the soil for planting. Correction of other ills caused by poor physical conditions of the soil should also be preventive remedies.

After the diagnosis has been made and the deficiency determined, there still remain several questions with respect to the proper remedies. First, what material should we use to supply the deficient element or elements? In many instances the more economical material is best used as a preventive remedy, while corrective remedies applied after the plants show deficiency symptoms will require more expensive materials. Timeliness and methods of application are other questions to be answered with respect to specific remedies. These questions are obviously interrelated so that choice of material, method of application, and time to apply are dependent upon each other. There is no space here to discuss all possible combinations of circumstances, but a few examples will illustrate the factors which should be considered in selecting remedies.

In the case of nitrogen deficiency of plants during the middle of the growing season, a rapidly acting remedy will be needed for successful correction of the deficiency. A water-soluble material applied as soon as possible as a foliage spray will offer the best chance to correct the deficiency. Foliage sprays of soluble materials usually give the fastest corrective action but normally are not suitable as the source of the total nutrient requirement of the plant. In fact, a water-soluble material applied to the soil will correct deficiencies in the plant as rapidly as foliage sprays, provided adequate moisture is present in the soil. In the case of phosphorus deficient soil being prepared for planting, the best remedy is to apply superphosphate or a mixed fertilizer containing this material to the soil during the course of its preparation for planting. Generally, the more soluble a material the more rapid its absorption by the plant.

Recommended fertilization practices are best listed in tabular form, although this method omits many of the details which should not be overlooked. The time of fertilization is quite important with many plants especially when maximum growth is sought with danger of winter injury. Avoid late fertilization with nitrogren of fruit trees, shrubs, and many perennials. The kind and amount of fertilizer material which should be applied can be determined accurately only after a soil or plant test and examination of the previous growth rate of the plants. Where such information is not available, experience must be the guide. Nutrient deficiencies can be avoided by systematic fertilization and by maintaining a good supply of organic matter in the soil. The good gardener uses and conserves any available organic ma-

TABLE 1
FERTILIZATION OF GARDEN PLANTS

PLANTS	FERTILIZER APPLICATION		
TREES	TIME	RATE	KIND
Deciduous - Ornamental Young	Dormant season	1 lb. for each inch of diameter at 3 ft.	10-10-10
Mature	Dormant season	1 lb. for each inch of diameter at 3 ft.	10-6-4
Evergreen - Ornamental	Early spring	1 lb. for each inch of diameter at 3 ft.	10-6-4
Deciduous - Fruit and Nut	Dormant season	½ lb. for each year of age	10-10-10
SHRUBS			
Rhododendrons and Azaleas	Spring	1 lb. for each 100 sq. ft. of area	10-6-4
Other shrubs	Spring	2 lbs. for each 100 sq. ft. of area	10-10-10
FLOWERS			
Annuals	At planting	2 lbs. for each 100 sq. ft. of area	10-10-10
	Mid-growth	1 lb. for each 100 sq. ft. of area	5-10-10
Bulbs	At planting	1 lb. for each 100 sq. ft. of area	5-10-10
	Early spring	1 lb. for each 100 sq. ft. of area	5-10-10
Roses	Early spring	2 lbs. for each 100 sq. ft. of area	5-10-10
	Early summer	1 lb. for each 100 sq. ft. of area	5-10-10
Perennials	Early spring	2 lbs. for each 100 sq. ft. of area	10-10-10
	Early summer	1 lb. for each 100 sq. ft. of area	5-10-10
LAWNS			
	Early spring	2 lbs. for each 100 sq. ft. of area	10-6-4
	Early fall	1 lb. for each 100 sq. ft. of area	10-6-4

terials. Such practices while often very impractical for the commercial grower are quite economical and practical for the home gardener. Table 1 lists time and rates of application of fertilizers for various groups of garden plants. The kinds or grades of fertilizers listed are for average soil conditions. Soil tests may indicate the need for different grades.

The following suggestions should reduce the need for corrective remedies of the gardener to a minimum.

1 - Choose plants to fit soil conditions, unless expense is no object. All soils will grow some plants well, but all soils cannot be made to suit all plants. The choice of plants will govern both the physical and chemical properties of the soil required for best growth.

2 - Inspect the physical condition of the soil before planting. If possible, remove materials which would physically obstruct the movement of water, air, and roots.

3 - Maintain high organic matter content of the soil by adding compost or other organic materials as needed. A good supply of organic matter is important in sandy soils to hold a larger supply of water and nutrients. In clayey soils a good supply of organic matter is essential for adequate drainage and aeration.

4 - Make a chemical test of the soil and add the indicated lime and fertilizer before planting. Additional amounts of fertilizer may be needed during the year depending on type of plant but the pre-planting application is the more important. The most important single chemical property of a soil is pH. Soil pH controls the solubility and availability of most plant nutrients and should be adjusted by proper use of lime for the plants being grown.

5 - Be observant of the plants while growing especially in the earlier stages. This is the time that corrective remedies may be applied successfully.

Interesting Observations On Amorphophallus Titanum Contained In Certain Garden Correspondence

By T. H. Everett

BECAUSE THE giant Sumatran aroid, *Amorphophallus Titanum*, is one of the most remarkable plants known and because it has been successfully bloomed in temperate regions on few occasions only, authentic information regarding it is always of interest to plantsmen. In the past tubers have occasionally been sent from its native home to botanical gardens far removed from the tropics, and undoubtedly others will be sent in the future; quite recently The New York Botanical Garden became the fortunate possessor of such a tuber. The circumstances of its acquisition are worthy of record and information given by the donor, in the course of correspondence with Dr. William J. Robbins, may shed new light on the behavior of this plant, or at least bring such information to the attention of those to whom it will be of interest and perhaps help. Before presenting some of the information sent to Dr. Robbins by Dr. H. A. Schrage of Siantar, Sumatra, some background discussion seems in order.

Amorphophallus Titanum produces not a large flower, but a gigantic inflorescence which, like that of the Jack-in-the-pulpit, calla-lilly, and anthurium, consists of numerous small flowers clustered on a central column called a spadix, and a large, more-or-less petal-like bract subtending the spadix. The inflorescences of amorphophallus, indeed, sufficiently resemble those of the Jack-in-the-pulpit and the calla-lilly for even the most non-botanically minded to decern the close family relationship that exists between them. All belong to the Aroid family, the Araceae.

If the similarities are obvious, the differences are not less marked. The

(Continued on page 125)

Episcia 'Acajou.'

EPISCIAS AND HOW TO GROW THEM

By Peggie Schulz

Episcia fulgida.

SEPTEMBER BRINGS WITH it a renewed enthusiasm for indoor gardening, and the alert gardener will find much to interest him in the genus *Episcia.* These versatile tropical plants can work wonders with a drab window or greenhouse-garden, for there are any number of ways they can be used. They make handsome specimen pot plants, subjects for hanging baskets, enhance long, low planters, and they thrive in terrariums. They can also be grown in a vase of water and handled as one-season plants. In the greenhouse they are of real value, because they will prosper in shady corners or under-the-bench areas. Episcias are not only attractive and beautifully shaped but they have the added advantage of supplying an array of red, pink, white or blue flowers at various times of the year.

Episcias belong to the Gesneriaceae (gloxinia and saintpaulia relatives) and some thirty species have been recorded. Very few of these, however, have remained in cultivation. In the early 1800's episcias were much sought after as stove plants, and a number of excellent color plates are to be found illustrating these early discoveries. Since these plants are once again gaining favor and being hailed as "new," their history should prove of interest to the casual grower as well as the collector.

About twelve years ago my first episcia was given me. A friend brought it in saying, "Here's something interesting for your garden, a bumble-bee plant from the Canal Zone." The plant was lovely with its hairy deep bronze leaves set off by heavy veinings of brightest green. Within six months it showed gleaming red flowers. Later I found it was *Episcia fulgida,* nowadays given the fancy name of "flame violet." I like the name the South Americans have for these plants, *Lazo d'Amour,* "lace of love."

Episcia fulgida was discovered in Colombia in 1873 and a plate of it appeared in *Botanical Magazine* 6136. *Fulgida* is one of the most popular of episcias and oftimes is sold under the name of *E. coccinea.* This name appears to have first been listed by B. S. Williams in an 1875 issue of Gardeners' Chronicle (English-Ser. 3, 1:490). *Fulgida* does have a variegated variety, 'Lady Lou' shown for the first time in 1954, with large rosy pink and bronze leaves. This variety is in small supply and quite expensive.

The leaves on a well-grown specimen of *E. fulgida* are four to five inches long. Although not a profuse bloomer, its tubular red flowers are showy against the dark foliage. About two inches long and an inch across, the edges of its five petals appear to have been nipped with pinking shears. Like all episcias, it has the distinctive trait of multiplying through stolons or runners—like strawberry plants. This species is vigorous and sends out such a number of stolons that it soon makes an interesting display. It's a wise choice for the window gardener.

Episcia cupreata is a great favorite with those who collect Gesneriaceae. Its varieties and hybrid forms feature leaves with full, rich copper or metallic-blue tones, frosted overtones, or enlivened with brighter shades. The flowers on all of them are in the red to red-orange range. Endemic to Colombia, *E. cupreata* was discovered in 1846. The leaves on the true species are hairy and of a rich coppery color. Well-grown specimen plants show faint streaks of rose or lilac along the midrib. The corolla tube is tinged with yellow and the upper part of the flower is orange-red. It, too, is a rapid grower.

One of the thriftiest of all episcias is *E. cupreata* var. *viridifolia.* This plant has glossy green leaves and is about the best bloomer of all episcias. Planted correctly and given good care, it soon becomes an elegant mound—a proper setting for its flashy red flowers. *Viridifolia* was discovered in 1860 and erroneously listed as *Cytodeira cupreata, Botanical Magazine* 5195. Another easy-to-grow episcia is *E. splendens,* a variation of *viridifolia.* Although the flowers are the same color as those of *viridifolia,* the smooth green leaves are stenciled with silver.

All of the hybrid forms have red flowers, but there is a vast difference in foliage coloring, texture, and rate of growth. One of the choicest of the cultivars is 'Acajou,' whose frosty-haired leaves show silvery green, fern-like patterns edged with brown.

'Chocolate Soldier' is aptly named, for its leaves are a shiny chocolate brown and green. This rapid-growing plant is a splendid choice for any type of indoor gardening.

Silver midribs and veins cutting through the hairy, emerald-green leaves are the distinguishing characteristics of 'Emerald Queen.' 'Frosty' has bright green leaves coated with silvery hair and marked by a wide silver midrib. 'Harlequin' has smooth shiny leaves, the dark brown edges of which contrast with the greenish white leaf centers, while 'Sylvan Beauty' has smooth silvery green leaves with rather light brown edges. 'Westwood' displays hairy silver-colored leaves margined with russet-brown.

An old glass compote makes a fine standard for *E. cupreata.*

There appears to be but one species with blue-tinted flowers in general cultivation. Botanically known as *E. lilacina,* it has in the past few years carried a number of horticultural names, best known of which is 'Fanny Haage.' This episcia has beautiful foliage with a wide pattern of green on brown, and throughout the spring and summer produces blue-tinted flowers of larger size than those found on the red-flowering species. I have never found it to be easy in the window garden, but it is so lovely it is worth a try. It handles with ease in a terrarium or greenhouse. A variation of this species has large bronze-colored leaves and lavender-blue flowers. Another, listed for several years as *E. chontalensis (Botanical Magazine* 5925*)* has small dark green leaves and pale blue flowers. The plant I have under this name does not tally with the color plate nor its legend, but it is a pretty thing. Somewhat different in manner of growth, the whole plant cascades, and its leaves are small. It is often the choice of gardeners with limited space.

Episcia punctata, discovered in Guatemala in 1843, is pictured in *Botanical Magazine* 4089 as *Drymonia punctata.* My first plant of this species was purchased under that name. The leaves are green. The cream-colored flower is shaggy-edged, and its throat speckled with dark red.

Hailing from central Mexico is the newest named species, white-flowered *E. dianthiflora.* Dr. Harold E. Moore, of Cornell University, and Robert Wilson, of Miami, Florida, are responsible for bringing us this enchanting plant. The pubescent leaves, about an inch long and one-half inch wide, are deep green veined with brown. Its charming white flowers show edges as fringed as a garden pink—thus its name. This miniature-type episcia was introduced late in 1954, and during that summer and fall I grew several hundred of them from seeds sent by a Mexican friend. The seedlings were exceptionally easy to handle, rapid growers, and in the entire lot, there was no leaf variation. *E. dianthiflora* grows indoors as easily as a succulent and it is, I think, a perfect choice for the window gardener.

A new hybrid, 'Pinkiscia,' which has pink flowers and dark brown foliage, has recently been introduced. As pink flowers are the choice of so many window gardeners, it will probably become very popular.

At the present time I am growing an interesting unnamed episcia, discovered in South America by Marion R. Mulford, of Lebanon, Ohio. The pebbly-textured leaves shade from pale silvery green to deep green. Although my plant has not flowered, this episcia is reported to have rather large cream-colored flowers, shaped somewhat like those on "slipper" gloxinias.

There are many ways to grow episcias, but their growing media must contain extra amounts of humus and some substance for aeration. In their homeland they grow atop deep leafmold or are found clinging to rotted logs and stumps. There they receive light filtered through dense forest foliage. Standard potting soil, such as is used for African violets or gloxinias, needs an added part of leafmold and about one-half part of sponge rock. There is a prepared mixture ("Black Magic") on the market, made of redwood leafmold, humus, and sponge rock, which is excellent for those who grow but a few plants or do not want to bother preparing soil.

Propagate episcias through leaves, plant cutting, stolons, or seeds. Root the plant parts in any media—water, moist sand, sphagnum moss, or vermiculite. Sow seeds atop moist sand or vermiculite and, when the seedlings have six leaves, transplant to two-inch pots. Plant single rooted plant cuttings or stolons in four-inch pots or, if a number of them have been propagated, plant several of them in a bulb pan or a long cake tin or planter. As new stollons appear pin them to the earth and they will take root. When the planter is filled, let some of the stolons dangle over the side. Plantings such as this produce heavier bloom than single potted plants because the new stolons,

being able to lodge roots in the soil, are no drain on the mother plant.

Episcias exhibit richer colored foliage in shaded growing areas, but they reward one with more flowers if they receive about as much light as African violets require. Eight hundred to one-thousand foot-candles of sunlight or three hundred to six hundred foot-candles of artificial light brings about a happy combination of good foliage and flowers. In the home, choose for them an east window in the winter, a north or northeast in the summer. If you have a greenhouse or a shady porch consider planting them in moss-filled hanging baskets. They flourish in wooden flats placed under greenhouse benches, soon providing a colorful bench cover.

Day temperatures of 70° to 75° and night temperatures of 60° to 65° seem conducive to proper growth. Below 55°, episcias "freeze" and their stems are apt to turn black.

These fibrous-rooted plants need considerable water to keep them in active growth. Their leaves can be washed with a fine spray of tepid water, if they are kept away from the sun until they dry.

Their most common pest is cyclamen mite, but if episcias are planted in partially sterilized soil and given occasional dosages of sodium selenate, they will stay free from mite.

Whether you choose episcias in bold or subdued foliage coloring, you will find that they lend fresh charm and excitement to your indoor garden.

AMORPHOPHALLUS TITANUM **(from page 122)** inflorescence may, as did one produced at The New York Botanical Garden in 1937 (See JOURNAL OF THE BOTANICAL GARDEN, Vol. XXXVII, Number 452, for August 1937), attain a height well over eight feet with the opening across the mouth of the upturned bell that the spathe forms, exceeding four feet in diameter and almost thirteen feet in circumference. *Amorphophallus Titanum* differs from all other known aroids in the size of its tuber which, in the specimen flowered at The New York Botanical Garden in 1937, attained an estimated weight of over one hundred pounds before it produced its inflorescence. It also differs in possessing what is perhaps the most powerful and disgusting odor produced by any plant; the stench of the open inflorescence (fortunately it does not last for many hours) distinctly resembles that of *Hydrosme Rivieri,* its close but much smaller relative from Cochin, China, which many people grow under the names of devil's tongue and snake palm, but is very much more intense.

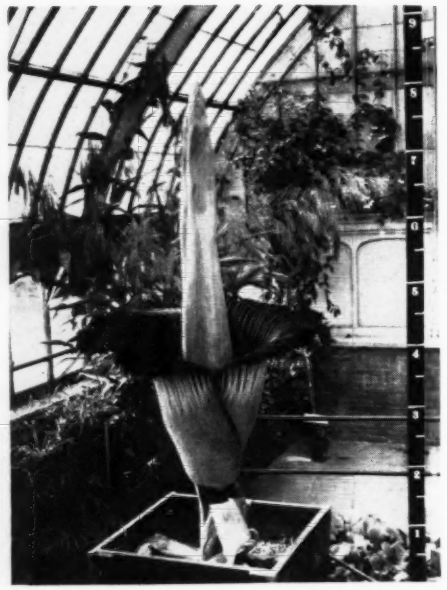
No cultivated specimen of *Amorphophallus Titanum* is recorded as having produced more than one good inflorescence and always, as far as I have ascertained, cultivated specimens have died within a short time after they have bloomed, although one is recorded as having produced one leaf a year after the inflorescence appeared.

The normal cycle seems to be for the plant to develop one leaf each year; successive leaves, under favorable growing conditions, become larger and larger, until finally the tuber reaches blooming size when the plant flowers, exhausts itself, and dies. Some years ago a traveler, familiar with this plant in its native haunts, told me that in the jungle the old tuber dies, but that before it dies long underground runners (to ten feet or so in length) are formed and, at the ends of them, young tubers.

I have personally cared for and cultivated three specimens of *Amorphophallus Titanum* that have bloomed, the one that caused great excitement at Kew in 1926, the one that caused even greater excitement at The New York Botanical Garden in 1937, and a smaller one that bloomed at The New York Botanical Garden in 1939. The tubers of none of these formed offsets, although I planted the last in a ground bed in a tropical greenhouse in the hopes that it might do so, because I thought that being confined in a tub, as the first two specimens mentioned were, might inhibit the production of offset tubers. So much for background — now for some excerpts from the correspondence between Dr. H. A. Schrage, a surgeon in the hospital at Siantar, Sumatra, and Dr. Robbins.

In September 1954 a letter came from Dr. Schrage inquiring about the fate of some seeds of *Amorphophallus Titanum* which he had kindly sent to The New York Botanical Garden some months previously but which had not, apparently, been received. (It is interesting to note that the first specimen of *Amorphophallus Titanum* ever to bloom outside the tropics was raised from seeds at the Royal Botanic Gardens, Kew, and bloomed there when

E. cupreata var. *viridifolia* grown in a long flat planter.



Amorphophallus Titanum caused great excitement when it flowered at The New York Botanical Garden in 1937.

ten years of age, in 1889). Dr. Schrage explained that he makes trips hunting for orchids and occasionally comes on the amorphophallus. Once he was lucky enough to get seeds of it (he sent a picture of the fruiting spadix; in the photograph a house in the background gives scale and reveals something of the noble proportions of the spadix).

Replying to a communication from Dr. Robbins, Dr. Schrage says, "Hunting for orchids in the jungle, I regularly meet with *Amorphophallus Titanum* but only twice have I found the flower. Enclosed you will find a snapshot of a stem bearing a bunch of fruits (brilliant orange-red) that was brought from the jungle (about three feet in height). The hornbill bird feeds on the berries and carries propagation further on."

Replying to Dr. Schrage's letter on October 28, 1954, Dr. Robbins expressed interest in Dr. Schrage's observations of amorphophallus, asked permission to publish some of the notes, and inquired about the possibility of Dr. Schrage obtaining for The New York Botanical Garden a sizable tuber of the amorphophallus.

This report includes the publication of the notes. Recently a healthy tuber (weighing twenty-five pounds) of the amorphophallus was received at the Garden and was placed in charge of our Head Gardener, Louis Politi.

Giving particulars of the specimen in fruit which he photographed Dr. Schrage says "Stem: Circumference 22 cm., total length 45 cm. (rachis 36 cm.). Leaf stem is heavily blotched, while the fruiting stem has a much finer design. The rachis seems, after withering of the inflorescence, to carry on with growing. In a young state the berries are green, turn to scarlet-red and, when they are full-ripe are orange-red. The ripening of the berries is from the top of the rachis downwards."

Dr. Schrage included with his letter two other photos, one of a leaf of an amorphophallus growing in the jungle which has a stem more than two meters tall, and of which Dr. Schrage promises to try and obtain the tuber for us, and another of what he thinks is very likely *Amorphophallus Brooksii*. This inflorescence has a much taller stem than *Amorphophallus Titanum*, but its spadix and spathe are less impressive.

The last letter received from Dr. Schrage, dated January 15, 1955, gives additional information of interest. He says, ". . . yesterday I came in possession of two fruiting stems of this plant (*Amorphophallus Titanum*) with ripe fruits . . . the fruits are quite ripe and on the top of the rachis they are already gone. On the rotten top of the rachis are lying four seeds, germinating. Is this coincidence or rule? Special attention for the enormous growing of the rachis after the female flowers are fertilized.

"During the flower stage the part of the rachis bearing the female flowers is about 10 to 12 cm. in length. On the fruiting stem I am describing now the measurements are: length of fertile rachis 52 cm., circumference at the top 20 cm., at the base 48 cm.

"There is still another thing to which should be paid attention, according to my observations and investigations. I think that a flower from a big corm will appear in much bigger size than, for instance, from a young, first-flowering, species. I never saw a flower of the size you described in your bulletin" (the JOURNAL OF THE NEW YORK BOTANICAL GARDEN).

It still appears that the inflorescence produced at The New York Botanical Garden in 1937 (from a tuber imported by Dr. Elmer D. Merrill in 1932) holds the record for size as far as published records of *Amorphophallus Titanum* reveal.

HYDROPONICS (from page 109)

at the Experimental Farm at Kalimpong are given:

For the Dry Season

	ozs.
Nitrate of Soda *or*	5
Ammonium Sulphate	4
Superphosphate	3
Calcium Sulphate	2
Potassium Sulphate or Muriate	1½
Magnesium Sulphate	2½

Apply weekly at the rate of one and a half to two ounces per square yard of trough space.

For the Monsoon

	ozs.
Nitrate of Soda *or*	5½-6
Ammonium Sulphate	5
Superphosphate	2½
Potassium Sulphate or Muriate	2½
Calcium Sulphate	1½
Magnesium Sulphate	2

Apply weekly at the rate of one and a half to two ounces per square yard of trough space.

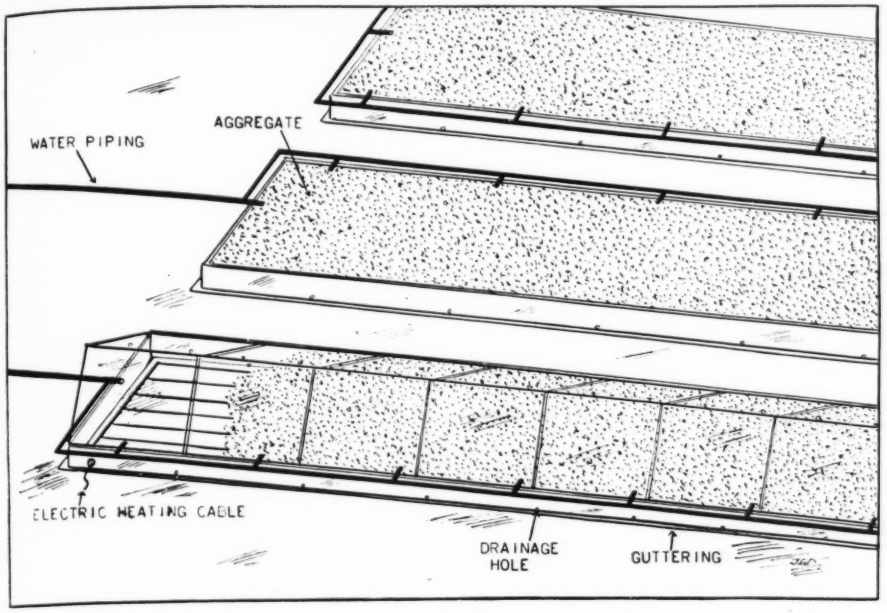
The general framework within which a formula should be built up is as follows:

Element	p.p.m.
Nitrogen	200-400
Potassium	100-200
Phosphorus	80-100
Magnesium	50-100
Calcium	300-500
Iron	2- 10
Manganese	0.5- 5
Boron	0.5- 5
Copper	0.5
Zinc	1.0

When using amberlites, or synthetic resins with anion and cation exchange properties, the following mixture and proportions have given good results in Bengal:

Amberlite	ozs.
$Ca++$	37
$Mg++$	18
H_2PO_4-	3
$SO_4=$	5
H_2BO_3-	1
$Fe++$	1 dram
$Mn++$	¾ "

The above amounts will last for six months in one square yard of trough space, if mixed with the aggregate at the start of the growing season. A solution of twenty ounces of potassium nitrate in one hundred gallons of water should be applied twice weekly. At other times, water only is used for irrigation purposes.



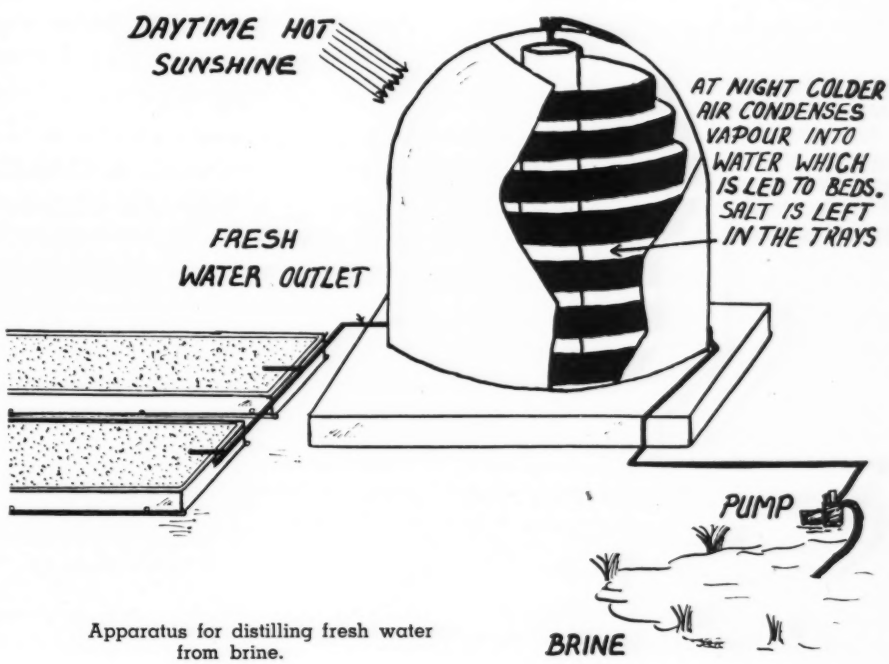
Hydroponics troughs, Bengal system. In winter, cloches and electric heating make it possible to grow out-of-season crops.

Recent research has revealed several new and even simpler adaptations of the Bengal system of hydroponics, but these novel techniques are still in the experimental stage. The beginner is advised to exercise considerable care in using them, but persons with horticultural knowledge will find the modifications worthy of trial. In particular, excellent crops have been raised by means of amberlites. These are synthetic resins on which are adsorbed cations and anions. They supply the plants with the necessary nutrients normally given in soilless culture through the fertilizer grade chemicals. Sufficient amberlites can be easily incorporated in the beds of aggregate at the start of the growing season to provide the crops with nutrients all the way along until they reach maturity. All that is then required is to water the plants periodically, though very often the addition of a small quantity of potassium nitrate to the water supply is beneficial. The complication of mixing up nutrient formulae, if tablets or already prepared powders are unobtainable, is avoided, there is no leaching during rainfall; and ideal concentrations are easy to get. In addition to the amberlites, there are vermiculite which makes a first-class light aggregate, phosphate pebble rock, and also activated sludge powder. The last-mentioned is quite odorless and simple to prepare from urban wastes.

The progress of soilless cultivation in India, since its inception at Kalimpong about seven years ago, has been striking. So far, practically all efforts have been concentrated on vegetable production, for the growing of food seemed the most important problem to be faced.

Not least among the advantages is the immensely enhanced yields from hydroponics. In Bengal over twenty-four pounds of tomatoes per plant have been regularly obtained; this, on a large scale, gives very profitable results. The production of maize has been raised from the normal figure of under two thousand pounds per acre to one of six thousand pounds of grain off the cob. Rice, cabbages, egg-plants, cauliflowers, and all types of salads have done well. As costs are low, and there is no laborious garden digging to do, naturally the eventual prices to the consumer are less. It has been carefully worked out that to maintain a hydroponicum of one acre entails an expenditure of about $8 monthly, excluding picking and harvesting of crops. The expense of building the original layout varies from a few cents to one quarter of a dollar per square foot, according to the materials of which the troughs are made. This, of course, represents a capital investment; the profits of the first year soon pay back the initial cost.

The question of using the Bengal system of hydroponics under American conditions is an interesting one. The simple design of the troughs and the easy method of culture, will commend themselves to both the commercial grower and the home maker. The latter can supplement her family's diet—and save money; the former can avoid the expense of soil sterilization and mixing of composts—and thus increase his profits. The saving of labor is a great attraction as well. It should be possible to undertake the development of the large desert and barren regions of this continent by hydroponic means. Soilless cultures conserve water better than do soil beds, since it is more economical to pipe the available supply


DAYTIME HOT SUNSHINE
AT NIGHT COLDER AIR CONDENSES VAPOUR INTO WATER WHICH IS LED TO BEDS. SALT IS LEFT IN THE TRAYS
FRESH WATER OUTLET
PUMP
BRINE

Apparatus for distilling fresh water from brine.

into troughs of aggregate than to dissipate it wastefully over the land. A simple portable device for distilling fresh water from brine has been devised.

Hydroponics is a new science. Much has been done, much remains to be done. It may yet feed large populations and open up the barren lands of America, as well as growing flowers and food crops in the great cities and congested urban areas.

A Hydroponic Information Centre has been opened at Post Box 31, Bombay, India, to provide advice and literture about the Bengal methods of soilless cultivation of crops.

TRUCK GARDENING (from page 117)

vested in the fall can be enjoyed all winter and spring. Apples, pears, and grapes can be stored for as long as seven months; late potatoes for nine months; onions six to eight months; and cabbage from three to four months.

In 1954, Americans consumed five hundred thousand bushels of apples which were kept for months in "controlled - atmosphere" storage, which slows down the breathing of the fruit and keeps it in a state approximating suspended animation. When the "sleeping beauties" are removed from the storage rooms, they have all the snap and tree-ripened flavor that they had the previous fall. Developed in England, and furthered in this country by experimental work at Cornell University, controlled-atmosphere storage may have applications to other fruit.

Atomic radiation will also play an important part in the fresh fruit and vegetable field in future years. The Atomic Energy Commission has produced an eighty-four page booklet on the "Contribution of Atomic Energy to Agriculture," in which numerous startling developments are reported. These include forcing mutations of corn to produce higher yielding varieties, which grow low and are easy to harvest.

"Cold sterilization" of potatoes and possibly other fruits and vegetables by exposure to gamma rays is another storage technique, which is expected to come into prominence in the near future. Experiments conducted at the University of Michigan have demonstrated that exposing potatoes to atomic radiation has prevented them from sprouting for eighteen months, without any loss in flavor. Since great quantities of radioactive fission material are available as by-products of atomic piles, it is likely that atomic radiation, in prolonging the storage life of fresh fruits and vegetables, may have an important effect on the fruit and vegetable growing industry in years to come.

Announcements of new developments in the field of fresh fruit and vegetable growing, shipping and storage turn up almost every week. Culling through trade papers in January, 1955, produced the following reports of innovations:

A process to use ethylene gas to ripen tomatoes in one-half to two-thirds the time, producing tomatoes colored evenly to the center, and equal or superior in flavor and texture.

A new grape harvesting machine, which will outdo the work of one hundred pickers.

An automatic packing machine for apples, which sizes and lays apples in individual trays, without being touched by human hands.

A transparent plastic bag used as a liner in boxes for the shipment of pears, and eventually other fruits. Similar to controlled-atmosphere storage, the air in the bag is pumped out and the "breathing" of the fruit slowed down.

Fruits and vegetables account for one-fourth, by volume, of the foods we eat. In the United States, this means about thirty-five million tons of fresh fruits and vegetables a year. Considering the fact that some produce is grown in every state, it is staggering to contemplate the shipping networks and distributive facilities required to deliver these perishable commodities to every hamlet in America. Yet movement of produce proceeds daily with clock-like precision.

New plant varieties, new developments in shipping and storage, new growing techniques are coming with such frequency that it is dangerous to predict what tomorrow will bring. We can, however, with some assurance, hope for the day that all known fresh fruits and vegetables, and some new ones, will be available every day of the year.

CATTAIL STORY (from page 115)

a trough containing rhizomes. Each boy plants a row. After the cattail has matured it is removed and rice is planted. Within less than three years the land is ready for any agricultural crop. We might well take a lesson from this little known practice. Perhaps cattail might aid in recovering saline areas along our Gulf Coast, where farming is sometimes unprofitable.

Three parts of the plant have been used as food. The pollen of typha was used to prepare a cake or bread; two dozen heads yield enough flour for a small cake. This is probably the only known use of pollen as a food. The rhizomes are entirely palatable roasted, eaten raw, or dried and ground into a meal. The young shoots were eaten by the American Indian and the Cossacks of the Don Valley.

Modern attempts to exploit cattail have met with some success. In 1916 German scientists claimed the fiber from the aerial plant would render Germany independent of importations of cotton, wool, and jute. It was reported the fibers could be worked into coarse jute or the finest cotton substitutes with all the strength and softness of cotton fabrics. The annual crop in Germany was estimated to be from five hundred thousand to six million tons. French scientists also arrived at similar conclusions. In 1951 Russian scientists claimed cloths made from typha fiber compared well with Russian standards for flax burlap in strength. Two British patents were issued on methods of obtaining the fiber by chemical and mechanical means. The author has been able to obtain a moderately strong fiber with cheap chemicals and has estimated the yield to be thirty to forty percent and three to four tons per acre.

Several studies have indicated paper can be made from the fiber. French scientists in 1948 suggested a system for harvesting and collecting the annual crop of typha from an estimated four hundred thousand hectares. It was reported ethyl alcohol could be produced from the chopped and dried cattail, while the vinasse was a complete fertilizer and the cellulosic residue useful for crude fiber, board, or capable of further purification.

During World War II a Chicago firm harvested and processed several million pounds of raw material from the spike. The fluff was used as a buoyant material in life jackets, being a fair equivalent of kapok. Furthermore, the seed hair was suitable for sound and heating insulating purposes, spinning

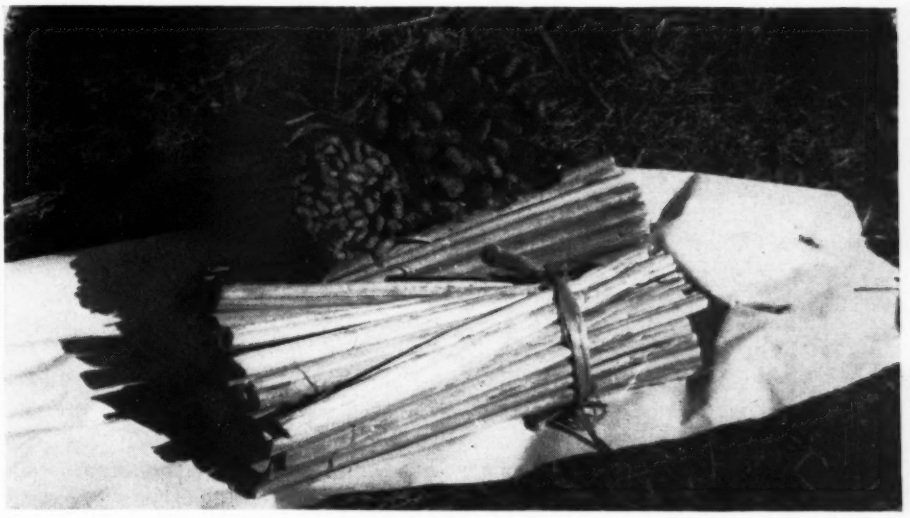
and weaving, and had good felting characteristics. In the opinion of the company, typha seed hair was "entitled to a position in the group of industrial vegetable fibers along with cotton, wool, and kapok." A German patent issued in 1942 described a method of preparing the seed hair for spinning.

In 1945 the Northern Regional Research Laboratory reported the seed contained seventeen and nine-tenths percent oil, sixty-nine percent of which was linolenic acid. It was proposed that the oil could be used as a drying oil and possibly as an edible oil. The annual cattail yield of spikes in the United States was said to be approximately five hundred million pounds. From this approximately two hundred million pounds of seed could be obtained, yielding thirty-four million pounds of oil and one hundred and sixty-six million pounds of extracted meal. Typha seeds were successfully used as a cattle and chicken feed. The crushed and extracted seed meal contains ample quantities of carbohydrates. The author has developed a method of extracting fertile seeds from the spike, employing a blending operation and a gravity-water separation of the fluff from the seeds. This process might find use if a method of wide scale planting is desired. Only fertile seeds are obtained from this method. The seeds are small enough to be sprayed on the planting site.

The author has successfully prepared flour from the rhizome employing commercial methods. Very palatable cookies were made from one hundred percent cattail flour. The fresh rhizomes were air dried, chopped in an ensilage cutter, dried further, and ground in a hammer mill. At least twenty percent of the rhizome consists of fiber. The moisture content is eighty percent of the air-dried material. In a comparison of cattail flour to corn, rice, potato and wheat, cattail has more fat, more mineral (with the exception of potato), as much protein as corn or rice, and more carbohydrate than potato. One stand of *Typha glauca* was estimated to yield one hundred and forty tons of fresh rhizomes. A German patent taken out in 1942 describes a process of obtaining starch and fiber from the rhizomes and leaves of typha by mechanical means. In the laboratories of Syracuse University, yields of eleven to twenty-one percent ethyl alcohol have been obtained from the crude ground rhizome.

At present it is reported that Germans are producing a structural material from the aerial plant mixed with mortar. A United States patent issued in 1951 describes a method of producing a light-weight insulating board from cattail fluff imbedded in plastic. In Rumania during World War I, large quantities of cellulose were reportedly produced from typha. This was also reported to be done in Germany during World War II. The leaves and leaf sheaths make an excellent mulch and bedding. Studies are under way to consider the aerial plant as a cattle fodder.

In summing up the cattail story, two important factors need mention: All the present uses remain essentially at what can be called the handicraft level. The greatest handicaps to exploitation on a large scale have been lack of mechanical means of harvest and the all-important economic factor. Work is under way to determine the advisability of cultivation to overcome the first handicap. While it may be a long time before the economic factor can be overcome in the United States, perhaps immediate benefit of the food and fiber resources can be realized in countries under-developed or short of such resources. The cattail is not destined for immediate commercial success — but some day the full potential of this interesting plant may be realized.



Cooperage stock from *Typha glauca*.

HYBRID LILACS

By Claire Norton

THE LILAC is no less popular today than when it bloomed in some garden of far Cathay, or when a hundred years ago the prairie schooner carried it into western America. But that gardener to the ancients, or that pioneer woman with her "slip" lovingly wrapped in moss and homespun and moistened with precious water from a waterhole along the westward trek, had no conception of the magic with which the plant hybridizer would touch the lilac.

At the time a "slip" of common lilac was being carried across the continent, a young man with an idea had but recently settled in Nancy, France. This was Pierre Louis Victor Lemoine, whose hybridizing work was to give such impetus to lilac breeding and selection. From the hands of this plant wizard and those of his son, Emile, have come some of the most beautiful lilacs the world has ever known. These modern hybrids, together with the introductions of other plant breeders who have followed the same general lines with *Syringa vulgaris*, we call by the all-inclusive term, French Hybrids.

Take, for example, 'Leon Gambetta,' introduced by the Lemoines in 1907. It has a lilac leaf on a lilac bush, and lilac fragrance and coloring. Here the comparison stops. Its flower is fully double, having the appearance of one floret inside of another and another inside of that, the innermost touched with tones of pink. The flowers are gathered

together in great symmetrical trusses, and may be produced first on bushes less than three feet tall, increasing in number and beauty as each year the plant puts on girth and height.

'Katherine Havemeyer,' with a similar double flower, is more pinkish lilac in coloring, makes a taller, more upright bush, but—at least in our garden—never arranges its flowering trusses quite so artistically. It came on the market fifteen years later.

If you prefer white in your flowers to the subtle lilac and pinkish combinations, there is 'Edith Cavel,' breathtaking in its beauty. We had our first great trusses of snow on 'Edith Cavel' before she had attained a stature of two

Syringa x *Prestoniae* var. 'Isabella.'

feet! And if you go in for ratings on the flowers you admit to your garden, then 'Edith Cavel' will just about top the list with a numerical rating conferred on it over 9, "best."

Or if you like a deep reddish purple, there is handsome, fully double 'Paul Thirion' (1915) and 'Mrs. Edward Harding' (1923), with a somewhat more open flower.

In the 1850's who, with possible exception of Victor Lemoine, could have imagined 'President Grevy' which the Lemoines introduced in 1886? Less "hose-in-hose" than 'Leon Gambetta,' termed a semi-double, 'President Grevy' runs to bluish lilac coloring. Although not so highly rated as some varieties, this one has long been a personal favorite. It has even improved on the fragrance so long loved in the common lilac, and its big blue trusses, arching the twigs with their weight, are the most graceful and enchanting of all the kinds we have ever grown.

Fully double and semi-double lilacs are not to the taste of all garden makers. "Lilacs," they say, "should be single." But surely there is no objection to broadening each individual corolla lobe and then packing the flowers into huge pyramidal clusters as does 'Vestale.' With the same purity as that of 'Edith Cavel,' this lilac introduced in 1910 is still the most popular white one.

'Massena' (1923) is reddish purple with wide lobes on deeply cupped corollas. 'Marechal Foch' (1924) is not quite so red; 'Etna' (1927) is redder. 'Lucie Baltet,' introduced in 1888 by a contemporary of the Lemoines, is that unusual coloring in a lilac, a true soft pink.

Most single lilacs, as every gardener who has ever observed a lilac flower close at hand knows, have a four-lobed limb spreading out from a cylindrical tube. Blue 'President Lincoln' and deep purple 'Monge' add a fifth hole as if on their way to becoming double.

This close-up of the popular pure white lilac 'Vestale' was taken in the author's garden.

The first was introduced by Dunbar in 1925 and 'Monge' is a Lemoine introduction dating back to 1915.

More familiar in form is the flower of one of the oldest hybrids of which we have record, and whose true origin is shrouded in mystery. This is 'Charles X,' which at maturity approaches the height and form of a small tree, carrying aloft a high-crowned mass of pinky mauve trusses every May. Its form, its hardihood, and unique freedom from scale attack make it good informal hedge material. It begins blooming on plants as young as those of the newer hybrids and produces its flowers much more freely than the common lilac.

This same type of flower, but in larger trusses and of the deepest purple-red, is found on 'Ludwig Spaeth,' another older hybrid, this one introduced by a second contemporary of the Lemoines. And it is the pattern used in the flower of the airy clusters of the Rouen lilac, which showed up almost two centuries ago and is considered a natural hybrid. This lilac can come into your garden under various names, the commonest being Persian lilac. One of its parents, *Syringa persica,* could well have been the lilac of Cathay.

Beautiful as are these French Hybrids and the still older Persian, gardeners being gardeners and plant breeders the most curious of the race, a further step has been taken in lilac hybridization. And when the hybridizer began to look at some of the wild species of *Syringa,* such as *S. villosa,* and *reflexa* and the Korean *S. oblata* var. *dilatata,* interesting things began to happen to the lilac.

Out of bloom, the Villosa Hybrids, such as 'Hiawatha,' would probably be identified as lilacs only by the botanically minded gardener. The symmetrical, vase-formed, rather slow growing bush is covered with handsome large, velvety textured, bronzy green foliage inherited from its Villosa parent. And

(Continued on page 132)

This is one of the more recent double white Dilatata Hybrids, with early-flowering habit. The stake is a three-foot rule.

FOR THE YOUNGER GENERATION OF GARDENERS

Grandpa's Letters to Janet

JUST IN CASE you missed my first letter to Janet and so are not acquainted with Snooper and Snuffy, I'll tell you they are squirrels who live in the Hemlock Forest. They are the biggest and smartest squirrels in Bronx Park. They are pals and specially enjoy roaming all over The New York Botanical Garden.

One day Snooper said, "Let's go over to the Rock Garden and call on the Friendly Flickers. We have an invitation to visit them. I met Freddy Flicker the other day and he was banging away with his chiselbeak on a hollow tree. 'Hi, Snooper, come up and see what a fine job I'm doing here,' he said to me, 'it's just about finished.' So up I went and would you believe it, he had chiseled out a heart with F/F in it for Fluffy and Freddy. They used to nest in the Hemlock Forest, but Fluffy told Freddy she wanted something different this year. After looking all around, she decided on a tree in the Rock Garden."

"All right," said Snuffy, "I'm ready to start. I always did like those birds. They return early each spring, and then we know good weather is coming soon. As soon as Freddy arrives, he starts his drumming on hollow trees in the Hemlock Forest. He's a good-natured, noisy guy. I've even seen him banging on a metal box because it made such a loud noise."

Snooper added, "You don't know how beautiful those Flickers are until you see the golden-yellow on the under side of their wings when they fly. I hear folks call them Golden-Winged Woodpeckers."

In a short time Snooper and Snuffy arrived in the Rock Garden which grown-ups call the Thompson Memorial Rock Garden. All the lovely little flowers were waking up from their long winter's sleep. They saw snowy white candytuft, pale pink sheets of moss phlox, gleaming yellow primroses, dark blue grape-hyacinths, golden and purple patches of crocuses, bright blue stars of chionodoxas. That last name is a mouthful, isn't it? And there they found the home of the Flickers. Fluffy and Freddy Flicker were in a tree near their nest. Of course, you know it isn't the kind of nest the Robin builds. It is a large round hole in the side of the tree, and the eggs are laid in the deep hollow. Fluffy Flicker had watched over the eggs until they were hatched. The six young flickers were now able to take care of themselves. The parent birds were glad to have a vacation and did not use the nest any more. They saw the two squirrels approaching and Freddy called, "Hi, Snooper and Snuffy, come up and visit us. You are the first company we have had. We are glad to see you."

The two squirrels scampered up the tree and Snooper, who always wants to know everything, started asking questions right away. "How did you come to choose the Rock Garden to live in, there are no other flickers here?"

Freddy replied, "Last year we lived in the Hemlock Forest and during nesting time saw only a few people each day. It really got too quiet for Fluffy, while she sat on the eggs. Some people passing under our tree were talking about the Rock Garden and how beautiful it is in the springtime. Right then and there, Fluffy decided the next time she was hatching a setting of eggs, it would be where she could see something interesting. So here we are and we love it." He turned to his mate and said, "Tell our friends about the big fight you had with the Starling."

"Yes, do," said the squirrels, "we didn't know you were a fighter."

"That was really something," said Fluffy. "Freddy was over on the river side of the Forest locating some ants' nests which would provide food for our babies when they were hatched out. I was just putting the finishing touches to the nest. You know, we flickers never leave any of the chips we have chiseled out lying at the foot of the tree. We carry them all away.

"Just when I had finished and was resting on this very branch, along comes a starling, goes through the doorway and down to the nest inside. Well, of all the colossal nerve, I screamed, as I flew to the entrance and looked in to see that starling had made herself comfortable in my nest.

"You good - for - nothing lazy bird, come out of there and build your own nest. Do you think I did all that drilling for you? 'I like it here and I shall stay,' said that impossible creature. Now, a flicker's nest is cozy for hatching eggs and feeding baby birds, but there isn't much room for striking a knock-out blow when two big birds occupy the nest. The best I could do was to peck at her and pull out feathers. The starling pecked her back and kept repeating, 'I like it here and I'm going to stay.' Finally, I had to go down into the nest, get a good hold on a wing, lift her up to the entrance, and throw her out.

"While I was resting on this branch after the tussle, that stubborn starling flew right in again. Well, I don't enjoy fighting, but I certainly wasn't going to give up the best home I had ever made—to a starling. If only there had been enough room to hit her hard on the crown with my chisel-beak, she would have seen more stars than she sees in a year. But I could only pull and push and peck. Finally I did get her out again.

"Some humans watched the tussle and when at last I threw that starling out, they clapped their hands. One man who knows the Latin names for birds said, *'Sturnus vulgaris.'* I surely agree with the vulgar part.

"That's enough about the fight. You know it has been fun to watch all the people in the Thompson Memorial Rock Garden. Some of the visitors stare at us through glasses, but they are kind and never do us any harm. We like the man with the blue uniform and cap, for we know he is a friend to all the birds and animals in The New York Botanical Garden. The person we see most often is a girl who wears dungarees. She spends most of the day working among the rocks, planting, transplanting, weeding, and making the Rock Garden look beautiful."

While Fluffy paused for breath after that long story, Freddy went on to say, "I like to watch the faces of the visitors when they come around that corner and get their first look at the lovely flowers and shrubs and trees. I think it's wonderful how flowers make people happy."

"You are right," said Snuffy. "Perhaps we should also include present company. Birds make people happy and so do squirrels."

"Time to go now," said Snooper. "It has been very interesting to hear of your adventures. Sorry you had to fight for your home, but it was worth it."

"'Bye now," they all said.

GRAMP

HYBRID LILACS **(from page 130)**

after the French Hybrids are all done with flowering, here come terminal clusters (strange in the lilac world) of deep rose-colored waxen flowers with longer than usual tubes to their corollas. These hybrids which have been developed in Canada are very hardy and, producing their blooms so late, are particularly adaptable where late spring frosts brown French Hybrid petals.

The Skinner introduction 'Hiawatha' is a cross between *S. villosa* and *S. reflexa*, with the ruggedness and foliage of *villosa* combined with the grace of the other parent, *reflexa*. The Preston Hybrids follow the same general line or combine the common *S. vulgaris* with the blood of *S. reflexa*, or as in the Prestoniae 'Royalty,' still another wild lilac, *S. Josikaea*, was combined with *S. reflexa*.

The Dilatata Hybrids from Skinner of Manitoba, are the earliest of all lilacs to bloom. Without the blood of their Korean ancestor, they might not be so tolerant of temperature extremes. Another trait carried from this parent when its blood was mixed with that of *S. vulgaris* is — no suckers! Such varieties as the purple 'Asessippi,' 'Pocahontas,' and 'Minnehaha,' and the lilac 'Evangaline' and 'Nokomis,' are much recommended for planting where growing conditions are truly rigorous.

These new hybrids not only extend the lilac blooming season at both ends, but they are most delightful "conversation pieces" to have in the garden!

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Bronx Park, New York 58, N. Y.

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BOOK REVIEWS

A TREASURY OF AMERICAN GARDENING. Edited by John R. Whiting. 272 pages, illustrated, indexed. Doubleday, Garden City, N. Y. 1955. $7.50

This is one of the most beautiful garden books I have ever seen. Its ten sections are profusely illustrated to augment the descriptions prepared by the writers, but each article is so good that it really needs no illustrations and would be valuable without them. However, the pictures do make a much more beautiful book — and a more inspiring one.

John Whiting in the introduction gives a most interesting account of the garden writers of the past and of the present. He makes a very good case for them as leaders in the horticultural world and shows what they have done to encourage gardening. His remarks remind me of what E. H. Wilson said so often years ago, namely, that before America could have the fine gardens that he wished to see here, it must have a fine garden literature.

T. H. Everett of The New York Botanical Garden has contributed a most valuable section for the home gardener. He goes into the general considerations of gardening first, and then one by one takes up special flowers which have been honored by being the subjects of special plant societies. Each of these flowers is superbly illustrated, as indeed are many other flowers through the book.

Mr. Everett's writings are always of interest, but it seems to me that in this section he has outdone himself in giving to gardeners a broad background of the work of the garden, the reasons that lie behind the different types of digging, sowing, cutting or pruning, and the whole processes of growth in nature, which so many of us have found it hard to understand. Interspersed with this are remarks on some of the interesting persons whom Mr. Everett has known during his horticultural career, and this gives to anyone reading it a better background of the history of American horticulture. I was glad to see this trend of telling about some of the people who had done important work in horticulture continued in some of the other sections.

Montague Free has contributed a splendid section devoted to the story of the soil. I do not know when I have read one as interestingly arranged or as carefully thought out to help the beginner. His explanations are very simple and very clear. This section, however, is not for the beginner alone, because Mr. Free goes further and shows the details of the many natural processes in the soil. He ends the section with the admonition that if man is wise he must keep the earth ever fit and ready to do its best work.

The next section is devoted to a pictorial garden calendar with twelve very good prints of Colonial Williamsburg. These will be particularly interesting to the many students of flower arrangement, or perhaps I should say period flower arrangement. The pictures are in full color.

Milton Carlton gives an astounding picture of the work of plant breeding, particularly in the last two decades which he says have witnessed greater progress than was made in all the previous recorded history of horticulture. This is a pretty broad statement, but the examples that he cites seem to prove his point, for in flower after flower he tells of the recent developments which all of us will remember. He is particularly interested, of course, in the annuals — petunias, marigolds, zinnias, and so forth — and the work which has been done with them; but Mr. Carlton covers also in less detail the work with perennials, with shrubs, and with trees. I was sorry that he had not seen fit to go into a little more detail with the latter groups, as I should have liked to learn more about breeding with flowering trees as well as breeding to make compact street trees. Also, I missed any reference to rhododendrons in which so much marvelous breeding has been done in England and America this past quarter century.

Marjorie Johnson furnishes the text to accompany a series of beautiful garden photographs by Gottscho-Schleisner; they are masterpieces and cover the whole range of garden types — the big formal garden — and the tiny backyard. One of the most charming of the photographs is a very simple scene — a couple of apple trees with daffodils underneath. Still another has just petunias against a white board fence.

Another remarkable section is written by Pat Pirone (Plant Pathologist of The New York Botanical Garden) on progress in plant science. He brings together in a comparatively few pages a very good resume of the work going on in the use of chemicals in the garden, for weed control, for fertilization, for easy rooting and for all the other wonderful things which the chemicals are doing. He tells of the chemical research that has brought this about and gives the trade names often of many of the ones that we can use in the garden, grouping them under their proper chemical type. He mentions those which are risky or dangerous to use, and those which are perfectly safe. Dr. Pirone gives the warning which all of us should heed that we cannot expect either the millennium or miracles from these new tools — and that they are tools to use in conjunction with other garden methods.

Fred Rockwell advises both the beginner and the advanced gardener in vegetable growing for the home. He considers the size of the garden, the types of vegetables to be grown, and the varieties, and includes lists of the varieties he likes the best.

Robert Lemmon has a section on trees, beautifully illustrated by Allianora Rosse. Among the ones shown are Colorado spruce, white pine, hemlock, tulip-tree, plum and sugar maple; the individual leaf is shown and the outline of the tree in summer and in winter.

Finally, Helen Hull has a resume of the part garden clubs have played in the development of horticulture these last fifty years. She goes back to the beginning of the first clubs, outlines their history and the history of the Garden Club of America and the Federated Garden Clubs which led up to the National Council. She claims for the National Council three hundred and ten thousand members and ten thousand clubs, which gives some general impression at least of the importance of these groups.

No one knows better than Mrs. Hull the routine of garden club work, as she has been president not only of her own club and of her State Federation, but of the National Council as well, and those positions, being followed by the presidency of the National Horticultural Council, put her in a position to know the horticulture of the country as few others know it. This article of hers while not running into a great many pages covers the subject adequately and makes a fitting climax to this fine book, which I feel really is a treasury of American gardening.

JOHN C. WISTER, *Director*
Arthur Hoyt Scott Horticultural Foundation
Swarthmore, Pa.

PLANTS WITHOUT FLOWERS. Harold Bastin. 146 pages, illustrated (drawings by Jane Burton); indexed. Philosophical Library, New York. 1955. (Printed in Great Britain) $6

There has long been a demand as well as a need for a cryptogamic botany for amateurs, a well-written, non-technical, informative book on the many groups of plants that do not bear flowers nor seeds. This is not that book. It is quite readable and usually interesting, and often succeeds in presenting clearly the major facts and relations of flowerless plants. But in detail, and with appalling frequency, it is inaccurate.

This is no place to enumerate the book's blunders. They seem to be those of a professional writer — one who has read up on, and then set out to expound, a subject. A professional botanist would be unlikely to offer the life-cycle for red algae given on pages 36 and 37, or the description of an ascus on page 51; an observant amateur would scarcely have characterized bracket-fungi as "all parasitic on living trees" (page 63), or the moss sporophyte as "non-green" (page 76). Readers of this book will learn a great deal — much that is true, and much that is not.

DONALD P. ROGERS

COMPLETE HOME LANDSCAPING AND GARDEN GUIDE. Raymond P. Korbobo. 368 pages, illustrated, indexed. Wm. H. Wise, New York. 1954. $2.95

What a wholesome influence this practical book could have on American suburbia! Avoiding adverse criticism of the dominant type of landscaping around America's homes, Mr. Korbobo follows, step by step, a very commendable procedure for the planning and planting of small properties. Obviously, this work is based on a very broad personal experience with plans for home grounds, a keen awareness of pitfalls which hinder success of the uninitiated, and an unusual leniency for personal preference.

Beginning with instruction on how to make a simple but workable plan on paper, the author discusses elements of landscape design — stressing the need and purposes of separate areas. From here, he continues with a text full of invaluable pointers on grading, soil preparation, enclosure, selecting and locating trees, drives and paths, foundation planting, permanent lawn areas, outdoor living areas, shrubs and vines, flower beds and borders, and garden features. For good measure, notes on sources of plant material and its care, ground covers and tree maintenance are added.

The book boasts eight well-chosen color illustrations and a great many line drawings, most of which make a fine supplement to the excellent text.

For new home owners as well as for those who dream of having a place of their own, I can think of no more easily available source of so much sound, friendly help. Surely, if its recommendations are followed, there can be little danger of developing a plan which will fail to give great pleasure and satisfaction for many years.

HOWARD SWIFT

STRAY FEATHERS FROM A BIRD MAN'S DESK. Austin L. Rand. 224 pages, cartoons by Ruth Johnson; indexed. Doubleday, Garden City, N. Y. 1955. $3.75

Dr. Rand, curator of the bird collection in the Chicago Museum of Natural History, is not only a man of science, but is a skillful teller of tales. The book is brimming with amusing and delightful stories of bird watching around the world.

Not only the birds appeal to Dr. Rand's sense of humor, but the bird watchers as well. For instance, one describes a bird sitting "with its stomach on the ground, with a big mouth and whiskers" — the whippoorwill, no less; or "a bill like a chicken and with flat feet at the back," which adds up to the pied-billed grebe.

Opening at any page the reader finds interesting, amusing, astonishing or fantastic accounts of bird and animal behavior; this book will be invaluable in a nature-study class, for reading aloud, or for the bedside table.

RUBY F. CHATFIELD
Whitehouse Station, N. J.

CHARLES DARWIN. Ruth Moore. 206 pages, indexed. Alfred A. Knopf, Inc., New York. 1955. $2.50

The number of readers in this country who are turning to the condensed novel, abridged biography, and similar short-cuts to good reading, is constantly increasing and in the past decade has increased enormously. For these readers this book is admirably suited. It supplies a rather large amount of information without, however, really giving the reader a very close acquaintance with the subject, that is, it will satisfy the desire of such readers for some information but not too much. Those who are really keenly interested in the life of this giant of science should by all means consult more detailed biographies. Since a detailed account is purposely avoided by the publisher, the preceding comments are not so much criticism as observation.

It is at once obvious that the author is unusually fond of and familiar with her subject, for her accounts of even the most mundane events in the life of Darwin take on a life-like warmth seldom achieved in the biographic style. Her mode of writing provides several hours of easy reading, and the man is so humanly treated that this reviewer must admit finding real pleasure between the covers of this little volume.

RICHARD S. COWAN

FLOWER ARRANGEMENT WORKBOOK 3. Myra J. Brooks. 64 pages, illustrated (photography by Roche); indexed. M. Barrows, New York. 1955. $2.50; also available in spiral edition, $2

Myra J. Brooks' Workbook 3 is a fine book for flower arrangers — new or seasoned — to own for reference.

Mrs. Brooks covers many phases of arranging. She takes you through flower show schedules right on down to decorative package wrapping.

She explains in detail the requirements of a particular class in a flower show — many an arranger has lost a blue ribbon for poor interpretation of a class in a show.

She has many original ideas as to containers, plant material and their combination.

She uses both fresh and dried materials to illustrate arrangements for holidays, doorways, coffee tables, wall pockets and baskets. Arrangements in glass shells, pitchers and many different kinds of containers challenges the reader to go out and find something new and different for the next show, dinner party or just a conversation piece for your very own family.

BEATRICE L. KIRSCHENBAUM
Harrison, N. Y.

FLOWER SHOW KNOW-HOW. William Thomas Wood and Marie Stevens Wood. 71 pages, illustrations. Merriewoode Press, Macon, Ga. 1954. $1 (paper).

The authors have written this book to guide and assist those who participate in flower shows — the Sponsor of the Show, General Show Chairman, Assisting Chairmen and their Committees, Judges, and Exhibitors.

To run a well-organized, beautifully staged flower show that brings pleasure and inspiration to a community, the Woods tell "How to Do It — Step by Step" from the time the garden club, federation, plant society, or other horticultural or business group decides to hold a show to the moment the Clean-Up Committee takes over the responsibility of closing the show. The sponsor wisely creates the Show Organization and chooses a General Show Chairman who can select the proper chairmen of committees that will function promptly and efficiently, and can keep preparations running, according to plan, smoothly and pleasantly between over-lapping committees until the successful conclusion of the show. Lists of duties, accompanied by occasional pictures and diagrams, are furnished for the various working committees. In addition to "Advice in Getting Proper Judges," there are comments and suggestions from nationally accredited judges. The authors suggest some "Themes, Layouts and Special Features for Shows," including one on Conservation.

The book includes a practical set of rules covering both horticultural and arrangement classes, with some mighty good advice to exhibitors on "How to Win Blue Ribbons" in both sections. Several pages of definitions clarify flower show terms and for the more advanced exhibitor there is a list of addresses of plant society secretaries. The book is a handy size, print large and clear, and the authors have retained simplicity throughout. An excellent guide for the novice and a practical reference for the more experienced worker at a flower show.

SALLY R. BULLINGTON
Syosset, Long Island

WHAT TREE IS IT? Anna Pistorius. 28 pages, illustrated. Follet Publishing Co., Chicago, Ill. 1955. $1.50

This little book with an attractive cover gives one or more interesting facts about thirty-four of our most common trees. Profusely illustrated in color, the detail sketches of the leaf, flower and fruits of each tree are excellent. The treatment, however, is elementary. The book might be an attractive gift for a city child who has little or no contact with trees.

ROMAINE F. BUTTON
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THE NEW YORK BOTANICAL GARDEN
Bronx Park, New York 58, N. Y.

10% discount on book prices to members of The New York Botanical Garden.

WILDLIFE OF THE PACIFIC NORTHWEST. Margaret McKenny. 299 pages, illustrated with halftones in black and white and 5 color plates. Binfords & Mort, Portland, Oregon. 1954. $3

There are those of us who may wish that Margaret McKenny had included the scientific names in her latest book, *Wildlife of the Pacific Northwest*, but though there may be a lack of scientific nomenclature, there is certainly no dearth of intimate knowledge of natural history. Into each delightful sketch is woven such an amazing amount of interesting information that the reader should have no difficulty placing that particular species, be it plant or animal, the next time it is encountered.

Margaret McKenny is, perhaps, best

(Continued on page 140)

NEWS, NOTES and COMMENTS

THE ANNUAL MEETING

Charles B. Harding, President of The New York Botanical Garden, presided at the annual business meeting at which members of the Class of 1955 were re-elected to the Board of Managers for a term of three years, and the Honorable Thomas C. Desmond, Dr. John M. Fogg, Jr., Mrs. L. Whittington Gorham, Mrs. Grayson Kirk, and Mrs. Eugene W. Stetson were elected members of the Corporation.

The death of William Felton Barrett, member of this Class of the Board of Managers, was announced with regret. Mr. Barrett passed away May 24, the date of the annual meeting. The vacancy caused by his death will be filled later.

DISTINGUISHED SERVICE AWARDS. The New York Botanical Garden presented a Distinguished Service Award to Dr. Fred J. Seaver of Olympia Park, Florida, for his investigations and publications on fungi. Dr. Seaver was Curator of The New York Botanical Garden from 1912 until his retirement in 1949.

A similar award was presented to Clarence McK. Lewis for his deep interest in and contributions to the Garden including the gift of his library in 1953. Mr. Lewis has been a member of the Board of Managers since 1930 and is the member with longest service on its Executive Committee. His former estate, "Skylands," at Sterlington, N. Y., now the site of Shelton College, was for many years a mecca for horticulturists because of its beautiful gardens and extensive plant collections.

The Distinguished Service Award was also presented to Mrs. Thomas Thacher for her deep interest in all projects of The New York Botanical Garden and her generous contributions to the Garden while serving as a member of the Advisory Council and as a member of the Board of Managers.

EXCERPTS OF THE PRESIDENT'S REPORT. Mr. Harding confined his observations to the financial position of the Garden, stating that it is anticipated the fiscal year will end with a surplus of $1,000 as compared to the deficit of $1,400 and of almost $40,000 the two previous years, respectively.

Contributions totaled approximately $284,000 up to May 19, 1955, as compared with $155,000 for the entire fiscal year ending June 30, 1954 . . . Largely through the efforts of our Administrator, A. C. Pfander, sales of plants, books and miscellaneous articles were greatly increased and returns from turnstiles were also greater . . . so that our efforts to obtain additional income from the large number of people who enjoy the Garden are making significant progress. This also indicates the Garden is widening its sphere of usefulness to the community . . .

"I know you will be interested in the results of the drive to raise the last $100,000 for completing and equipping the Laboratory. Largely through the generosity of members of the Advisory Council, Volunteer Associates, and Board of Managers, we have received to date approximately $32,000 of which the Advisory Council has been responsible for $25,000. In addition, we are conducting a campaign by mail and personal contact with the important drug and chemical companies in the country . . .

"The general financial situation of the Garden has improved in many ways but there are still hard-pressed areas of need, if we are to keep the work in all departments up to effective levels. There are many activities which a botanical institution such as ours should undertake but which cannot be done unless more funds are forthcoming . . ."

Mr. Harding, in calling attention to the renovated main floor of the Museum and Administration Building, stated that the work the Display Committee has accomplished in little over a year is truly remarkable. The exhibits are up to the most modern standards and are attracting increasing numbers of people . . .

"This spring we embarked on a campaign to secure new members for the Garden. For many years our membership list has fluctuated around the 1,700 level. Compared with most of the great institutions in New York, this number is pathetically small. When you consider what a member receives in the way of service, discounts on purchase of books, plants and other material, in return for the ten-dollar membership fee, it is hard to understand why we do not have ten times as many members. We have circulated membership literature in Westchester County, northern New Jersey, New York City and Long Island, both to a paid list of householders and to lists furnished us by a few members of the Board of Managers, Volunteer Associates and Advisory Council. I am convinced that membership appeals sent with a personal note to a list of people chosen by those who are already members of the Garden are much more effective than those sent in routine fashion to a list of purchased names. I hope more of our members will help us . . . It takes little time and nothing, in my opinion, could be more effective in building up an interest in the Garden's work than getting new members. I feel certain that new members will be most grateful to you for bringing this opportunity to their attention . . .

"Since the campaign started we have obtained 110 members of whom 75 are traceable directly to this effort. The balance can be attributed to the efforts of the Garden's staff . . ."

Mr. Harding concluded his report with an expression of his personal gratitude to Commissioner Moses of the Park Department of the City of New York and members of the Board of Managers, Advisory Council, Volunteer Associates, and the staff of The New York Botanical Garden, for their enthusiastic cooperation and unselfish work during the past year. Mr. Harding feels that the institution is in better shape than it has been at any time and looks forward to an increasing momentum in moving toward its objectives.

EXCERPTS FROM THE DIRECTOR'S REPORT. Dr. Robbins reported notable progress has been made during the past year in several directions. The initiation of the construction of the Research-Laboratory—the first entirely new building since the Conservatory and Museum were built some sixty years ago — marks a definite forward step. The construction of a laboratory building was proposed in a report on scientific research published in 1925. It has taken thirty years to make the proposal a reality.

The new building, which will be ready for occupancy next spring, will provide modern facilities for research in microbiology, plant biochemistry, plant pathology and plant physiology. The investigations will include work on the diseases of plants, especially ornamental plants, abnormal plant growth, plant nutrition, in particular the relation of vitamins, aminoacids and similar substances to the growth of plants and growth inhibitors (antibiotics), fungi, and bacterial viruses.

The Board of Managers has authorized the designation of individual laboratories as Memorial Rooms in the Research-Laboratory and Dr. Robbins announced that the Advisory Council and the Volunteer Associates have subscribed for Memorial Rooms as have Senator Desmond in memory of Liberty Hyde Bailey, Mr. and Mrs. Huntington McLane in memory of Mrs. Oakleigh Thorne, Mrs. Hermann G. Place in memory of John Bassett Moore, Mrs. Alex Pinney and her sister in memory of their mother, Mrs. Sarah Coombs, and Clarence Lewis. It is hoped that part of the cost of new equipment will be made by contributions to these Memorial Rooms.

The renovation of the Conservatory has been completed and the Lorillard Snuff Mill restored and converted into a meeting place and restaurant. The Conservatory courtyard has recently been attractively replanted. These facilities enable the Garden to provide more effectively for the entertainment, recreation, and instruction of the public.

From time to time, Dr. Robbins stated, it seems desirable to comment on some im-

Have you a friend who would enjoy the privileges of membership in The New York Botanical Garden? Why not tell him about them, and suggest that he, too, become a member?

- Reduced rates for study courses, lecture tours and other activities for which the Garden charges a fee.
- Share in the annual plant distribution.
- Discounts on the purchase of books, bulbs, plants.
- Admission to Members' Day Programs and to previews of special exhibits.
- Personal conferences with staff members on plant identification, on culture and care of plants.
- Use of the library and, under staff guidance, the herbarium.
- Free rides on "The Floral Flyer" (tractor train) and free parking at the Garden on weekends and holidays.

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A member of The New York Botanical Garden also has the satisfaction of contributing to the advancement of the botanical and horticultural sciences.

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portant aspect of the Garden from a longer view than the activity of a single year. The herbarium and its staff are a major part of The New York Botanical Garden . . . There are more than 2,400,000 specimens in the herbarium, making it one of the great collections of the world. The staff includes fourteen people and the annual budget exceeds $100,000.00.

In addition to the service performed by this department in furnishing authentic information about plants, accommodating visiting investigators and supervising graduate students, identifying plants for the general public and for specialists caring for the herbarium, loaning herbarium specimens, monographing special groups of plants, teaching and lecturing, it pursues four major projects. These include the preparation of a flora of the Pacific Northwest in cooperation with the University of Washington; a flora of California in cooperation with Rancho Santa Ana Botanic Garden; a study of the flora of the Great Basin in cooperation with the Utah State College; and a study of the flora of northern South America. Each of these major projects requires extensive field work and regional revisionary, monographic and phytographic studies in preparation for the floras themselves. It is estimated that the first two projects may be completed within the next three or four years. The second two will require substantially longer periods of time.

Dr. David D. Keck, Head Curator, with aid from the American Philosophical Society, visited botanical centers in Europe and spent six weeks studying critical material in the natural history of Vienna . . .

Since its establishment The New York Botanical Garden has been concerned with the study of the flora of South America, in fact, interest in the plants of South America may be said to have been a factor in the founding of the Garden, because Dr. and Mrs. Britton received the inspiration for such an institution when they visited Kew in order to study plants collected in Bolivia by Dr. Rusby . . . For the past twelve years extensive work has been carried on which will eventually result in the publication of floras of Venezuela, of the Guayana Highland, and of the Guianas, in cooperation with the University of Utrecht, the Royal Botanical Gardens at Kew, the National Museum in Paris, the National Museum of Venezuela, and the Chicago Natural History Museum.

Such floral investigations often have unexpected applications. During the past year an investigation was begun by Dr. Maguire and Dr. Cowan on the correlation that may exist between plant cover and underlying deposits. A survey was completed by Dr. Wurdack and Mr. Guppy for the National Bulk Carriers, Inc., of the kind, number and sizes of woody plants in a substantial area in Venezuela. Also, two hundred calabashes of curare were obtained by Dr. Maguire and Dr. Wurdack from the primitive Indian tribes who prepare it. This is the largest quantity ever obtained at any one time and contains enough active poison to tip a million or so lethal darts. Curare, which has been used in blowguns by the primitive tribes south of the Orinoco in southern Brazil, is now used for chemical analysis. The curare collected by The New York Botanical Garden will be used for study at the University of Rochester to determine the alkaloids in curare that may be important in certain types of medicine.

Dr. Robbins cited an instance to illustrate the importance of botanical study. *Rauwolfia serpentina* has assumed considerable importance in controlling high blood pressure and in treating mental illnesses. Plantations of *Rauwolfia serpentina* were started in Java, but a specimen sent to the herbarium was found by Joseph Monachino, who has made a special study of this plant, to be a quite different species. The true *Rauwolfia serpentina* is now being cultivated in Java.

Dr. Robbins' report also included summaries of the various aspects of the work of the Garden. The modernization of the Museum Building, installations of road markers and guides and posts in the Rose Garden, assistance in the setting up of permanent displays and in the flower shows, repair of damage by hurricanes Edna and Hazel, in addition to normal maintenance, kept Vincent Rampino, Superintendent of Buildings and Grounds, and his force, fully occupied . . . Louis Politi and his corps of employees in the gardening department had an unusually heavy load because of flower shows, replanting of the Conservatory and courtyard, planting of the areas near the Snuff Mill, changes in the Rose Garden, and so forth. Over one hundred fifty-six thousand eight hundred and fifty plants, exclusive of permanent collections were grown for the shows; fifty-eight thousand five hundred for the rock garden, chrysanthemum border and nursery; seven thousand two hundred and ninety plants were set out in the rose garden, Havemeyer lilac plantation and Montgomery conifer collection, and the Snuff Mill area.

T. H. Everett continued his diversified activities as Horticulturist and, on being appointed Curator of Education, assumed the responsibility for the Educational Program . . . Four hundred and fifty-nine students registered in seventeen courses; seven thousand seven hundred and twenty-three attended the free Saturday Afternoon Programs. Mr. Everett was ably assisted by Howard Swift, who was appointed Assistant to the Horticulturist and Curator of Education in July of last year.

Among the many tests conducted by Dr. P. P. Pirone were air-layering tests of more than twenty different kinds of trees and shrubs. Most of the root stems were removed, potted in soil, and then successfully grown on. Dr. Pirone is also investigating the effects of supersonic waves on seeds and on plant diseases, in a cooperative project with Professor M. Cefola of Fordham University's chemistry department, and M. Shawarbi, a Fulbright Scholar and Professor of Agricultural Chemistry at the University of Cairo, Egypt.

One thousand three hundred and seventy-seven bound volumes were added to the library during the past year, making the total sixty-one thousand one hundred and thirty-eight. The most outstanding gift was the extensive library of seven hundred and ninety-seven bound volumes, several thousand separates, reprints and unbound works from Dr. Elmer D. Merrill. It is not possible to name all one hundred and twelve donors and their substantial gifts, but mention should be made of a group of nineteenth century, beautifully illustrated books on natural history and two valuable works on Japanese gardens from Edward M. Bratter; one hundred and seventeen works on botany and gardening from Mrs. Frances R. Masters; three hundred botanical theses and reprints from the New York Academy of Medicine. Miss Hall, Librarian, and her assistant, answered four thousand and thirty-six calls for information.

Dr. H. W. Rickett, Bibliographer, performs diversified duties, as do many members of the staff. He edited two numbers of "Brittonia," two members of the "Memoirs" and the first part of the new series of "North American Flora . . ."

In the Research-Laboratory, under Dr. Robbins' direction, work was conducted on unidentified growth substances present in a number of natural products . . . on the factors responsible for abortion in strains of *Neurospora* furnished by Dr. B. O. Dodge . . . on abnormal growth, most of the attention being devoted to the tumors produced by *Agrobacterium tumefaciens*, using carrot tissue. The isolation and characterization of three etiological agents which are active in the formation of a normal plant cell into a tumor cell have been of major concern during the year . . .

Antibacterial investigations included partial or complete elucidation of the structure of several antibiotic compounds previously isolated, as well as the development of procedures for the isolation of new antibiotic compounds and preliminary characterization of them . . .

Attention in antiviral investigations were directed mostly to three substances — Chrysomycin, Aklavin and Nybomycin. The elementary chemical composition of Aklavin has been determined, its antiphage and antibacterial activity tested, and publication is in preparation. The elementary chemical composition of Nybomycin has also been determined and a report of its characteristics is ready for publication.

REPORT FROM THE ADVISORY COUNCIL. In the annual report of the Advisory Council, Mrs. John D. Beals, Jr., Chairman, stated that in response to Mr. Harding's appeal for funds for the new laboratory, the Council voted to subscribe $2,500 to endow the room for the Plant Pathologist . . . the amount collected by the Council to date for the laboratory is $24,330.00.

The Council also voted $250 to the talented Display Committee for the purchase of a diorama. The two exhibits — one of dried material and the other of pruning — have done much to enhance the main floor of the Museum Building, as well as to educate the public.

The perennial border, under Mrs. John E. Parson's aegis, is finished, that is, finished as far as a perennial border ever is. Depredations of one kind or another are ever-present, and replacements must be made.

Daffodil bulbs left over from the flower show have been planted on the bank opposite the Snuff Mill and the Advisory Council hopes to continue with hemlocks, ivies and other plants indigenous to river banks . . . Mrs. Guthrie Shaw is responsible for the project.

In November, the Council will have educational and horticultural exhibits in the seven windows of the East River Savings Bank at Rockefeller Plaza, as a means of enlisting the interest of the public to the extent of joining The New York Botanical Garden. These exhibits will be staged under the guiding hands of Mr. Pfander and Mr. Politi, assisted by Mrs. Charles Burlingham, Mrs. Donald B. Straus, and Mrs. John E. Lockwood.

REPORT FROM THE VOLUNTEER ASSOCIATES. Mrs. Charles G. Proffitt, liaison officer between the Advisory Council and Volunteer Associates, presented the report of the latter organization in the absence of the Co-Chairmen, Mrs. James C. Brady and Mrs. John G. Winchester:—

The emphasis this past year has been towards services to members of the Garden, as well as money-raising projects . . .

With Mrs. Percy Douglas and Mrs. Henry B. Roberts as co-chairmen, the Volunteer Associates, in conjunction with the Clermont Community Center and the Red Hook Students' Aid Association, held a two-day tour of the historical Hudson Valley in October 1954. Of the net profit of almost $5,000, $1,000 was given to the Red Hook Students' Aid Association, and $3,900 was equally divided between the Clermont Community Center and the Botanical Garden.

The net profit for the November 1954 theater benefit, co-chaired by Mrs. Richard S. Meredith and Mrs. Charles G. Stradella, was $8,400. . . .

195 tickets were sold for the Downtown Morning Lecture Series. Part of the net profit of $240 was used to purchase a badly needed screen. Mrs. Oakley Sheldon was chairman.

250 members and guests attended the First Annual Members' Day in the French Institute Auditorium on February 10, when Dr. John F. Enders was guest speaker. Mrs. James W. Maitland was chairman of arrangements, and members of the Advisory Council and Volunteer Associates were hostesses.

Mrs. Clarance Stanley and Mrs. John L. Senior were co-chairmen of the Spring Garden Tour to Greenwich, Conn., on May 9. 220 persons participated in the tour—40 reservations had to be returned because of the small size of the gardens.

The Volunteer Associates were hosts to members of the Cosmopolitan Club at the Garden on May 19 and hope to invite other clubs to enjoy a similar program, thus broadening the circle of friends of The New York Botanical Garden.

The final event of this year, under the chairmanship of Mrs. Albert Francke, Jr., will be a gala dinner on June 14 at the Snuff Mill to introduce the Snuff Mill as a delightful spot for summer dining . . .

The Display Committee — Mrs. Charles Burlingham, Mrs. Richard S. Meredith, Mrs. Donald B. Straus — has labored tirelessly on the renovation of the Museum Building and with the many special exhibits. Through this committee and the efforts of individual members of the Volunteer Associates, $11,000 has been raised over a period of four years. All the money has been spent on the renovation of the Museum wings and the special exhibits.

Following the business session Dr. Bassett Maguire, Curator, who recently returned from extensive exploration of northern South America, reported completion of the twelve-year program of exploration of the Guayana Highland and outlined the new geobotanical studies being initiated in South America.

The New York Botanical Garden's Plant Exploration Program of Guayana Highlands Now Completed. The field parties that have made 1954-1955 the biggest collecting season in northeastern South America in the history of The New York Botanical Garden have returned to New York. Four expeditions were made to that region and the objectives were multiple.

The over-all objectives of the Garden's program of plant exploration in northeastern South America have been to gain a broad knowledge of the flora and its relationships to other floras. Somewhat more limited objectives include a floristic account of the Guayana Highland, extending across southern Venezuela south of the Orinoco from the Colombian boundary eastwart to Tafelberg in Surinam, a flora of Venezuela, and a Guianan flora.

Field work that has extended over a period of twelve years on the Guayana Highland has now been completed. A major collection was made on the largest of these sandstone table mountains that comprise this area, Chimanta-tepui, in central Venezuela, by an expedition led by Dr. John J. Wurdack, assistant curator of the Garden. He was accompanied by Dr. Julian A. Steyermark of the Chicago Natural History Museum. These explorers were successful in reaching and traversing a sizeable portion of the top of this mountain, from which they brought back novelties.

Other outposts of the Guayana Highland were reached by Dr. Bassett Maguire, curator in charge of tropical explorations, when he visited Serra Tepequem, a table mountain of this system wholly within Brazil; Serra do Sol on the Brazilian-Venezuelan boundary, just south of Roraima; and Ayanganna, the highest of the sandstone tabular mountains in British Guiana.

Dr. Maguire and assistant curator Dr. Richard S. Cowan, either working together or more often separately, collected extensively at many different localities in British Guiana and Surinam. Dr. Cowan also collected in French Guiana and in the state of Amapa, nothern Brazil. During the past season considerable attention was given by these collectors to a special phase of plant ecology, namely, the relation between plant cover and soils, with the aim of determining possible correlations between the vegetation and specific soils. This phase of the work is geobotanical and must be conducted with the precise setting up of transects across known soil boundaries, analysis of the plant cover in selected quadrats, and so on.

Dr. Wurdack was able to make collec-

Dr. William J. Robbins, Director, examines one of the two calabashes of curare which Dr. John Wurdack, assistant curator of The New York Botanical Garden, brought back from a recent plant expedition to northern South America. Dr. Bassett Maguire, Curator in charge of tropical plant explorations, is at Dr. Robbins' right.

Built on a hillside, the gardens of Mrs. E. R. Behrend, of Greenwich, Conn., are appropriately named "Glenside." In one of them a gazebo is featured.

tions in October and April along the lowlands of the middle Orinoco. He also visited the delta of this river. In brief, the various field parties made serious collections during the season just concluded at important intervals from the middle Orinoco almost to the mouth of the Amazon. Part of the work was financed by a research grant from the National Science Foundation.

Summer Botanical Activity of Staff Members of The New York Botanical Garden. With the return of these staff members, other staff members of The New York Botanical Garden are making plans for summer botanical activity. Dr. Arthur Cronquist, associate curator, with the aid of a grant from the American Philosophical Society, is leaving in late May for a busy collecting season within the area being covered by the large illustrated flora of the Pacific Northwest that he is engaged in writing in collaboration principally with Dr. C. L. Hitchcock of the University of Washington. Dr. Cronquist expects to make collections during the spring in northern Malheur County, eastern Oregon, and summer collections in the mountains of east-central Idaho and the Beartooth Mountains of southern Montana.

Dr. David D. Keck, head curator, is planning consultations in Claremont, California, with Dr. P. A. Munz, director of the Rancho Santa Ana Botanic Garden, the co-author with whom he is writing a flora of California. Dr. Keck also plans to make studies in several West Coast herbaria.

Staff Members Receive New Designation. At a recent meeting of the Board of Managers of The New York Botanical Garden, Dr. David D. Keck was designated Assistant Director and Head Curator; and Dr. Bassett Maguire was designated Curator and Coordinator of Tropical Research.

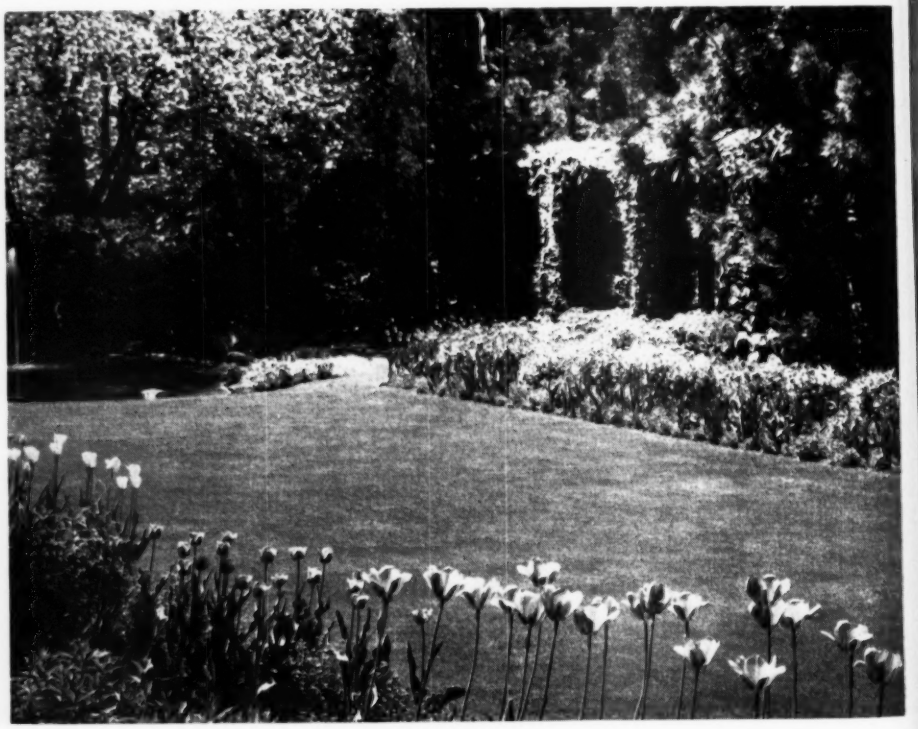
Spring Garden Tour. The tour sponsored by the Volunteer Associates of The New York Botanical Garden, with Mrs. John L. Senior, Jr., and Mrs. Clarance Stanley as co-chairmen, was well organized. The gardens visited in Greenwich, Conn., are intimate and altogether charming.

Vinca, euonymus, pachysandra, and ivy are used freely as groundcovers along the drive and across the area adjacent to the New England farmhouse at "Millstream Farm." The attractive dwelling, to which additions have been made by the owner, Mrs. Gilbert Kinney, is tastefully furnished with old pine and maple and beautiful old hooked rugs. Two fine specimens of box flank the bay window and at one corner of the house is a superb American holly, probably thirty-five to forty years old.

The subtle combination of blue and white phlox along the top of the wall of the sunken garden with the rich blue of the violas at the base of the wall caught everyone's fancy.

The residence and gardens of "Glenhill," the property of Mrs. E. H. Behrend, are built against the side of a hill and the most effective use has been made of the varying elevations of the land. Apple trees have been employed conspicuously in the garden plan, typical of many of the older American country homes. The stalwart hedge of European hornbeam is not common in this country but is frequently seen in Europe. The gazebo featured in the garden above the rose garden also delighted the visitors—so did the very large specimens of the jade plant *(Crassula argentea)* grown in Chinese porcelain containers in the studio window.

The luxurious white and pinks of many flowering trees commanded attention as the participants in the Garden Tour left the busses and approached the French provincial house at "Quarry Farm." There are wonderful trees in the beautiful gardens of Mrs. Reynolds Bagley. Aged red oaks and numerous tulip-trees, hollies, Japanese maples, and some trees not often seen—for instance, a large weeping Sargent's hemlock, umbrella pines *(Sciadopitys verticillata)*, table mountain pine and Japanese black pine *(Pinus pungens* and *P. Thunbergii)*. The perennial border, the cutting garden, and the greenhouse are in splendid condition and contain a pleasing selection of plant material. The clump of birch trees and shadbush along the inlet of Long Island Sound, separating the residence lawn and garden from the Normandy farm groups, makes a pretty scene. Another enchanting little corner — a clump of birch with an underplanting of yellow



"Chelmsford," the gardens of Mrs. Elon Huntington Hooker at Greenwich, Conn., have a delightful English atmosphere. This is a view of the perennial garden and fountain from the residence.

tulips and forget-me-nots beside a small pool.

The estate of Mrs. Elon Huntington Hooker is named for a town in England—Chelmsford—from which an ancestor departed to seek a life in the New World. "Chelmsford" has a distinctly English atmosphere, both indoors and throughout its gardens and woodlands. The design follows a natural trend and the overall effect is peaceful and restful. There are charming vistas across spacious lawns dotted with beautiful trees and boxwood. There is a fine planting of *Cryptomeria japonica*. This Japanese tree furnishes bark which is often used by Japanese peasants to shingle the roofs of their houses and for timber. A little green garden, a small rock garden, a fountain and pool at the far end of the extensive herbaceous border (the tulips in this border were magnificent, showing the cultural skill of the gardener), a fragrant lilac walk, a border of peonies in many varieties including the Japanese tree peony and colorful azaleas — is it to be questioned that guests were reluctant to leave "Chelmsford" in order to board the busses for the homeward trip?

Youth Program at the Garden. With the support of the Bronx Chamber of Commerce, The New York Botanical Garden will conduct a youth program as its contribution to the overall effort to prevent and curtail juvenile delinquency. The Garden believes that one way to eliminate this serious problem is to occupy children during some of their free time in an interesting, constructive program.

A school garden project to give the children an opportunity to care for a garden plot will begin early next year.

In order to make the program as comprehensive as possible there will also be guided nature walks. These walks, to be conducted in many parts of the city, will start in September.

Activities of the Garden's Plant Pathologist. Dr. P. P. Pirone addressed the annual meeting of the Women's National Farm and Garden Association during that organization's visit to the United Nation's Headquarters on May 12, 1955. He described some of the unusual problems involved in the maintenance of the gardens around the United Nations. Dr. Pirone acts as consultant on landscape maintenance for the United Nations Headquarters.

On May 6, 1955, Professor Gordon King of Massachusetts State College and ten graduates of his arboricultural course made their annual visit to the Garden and to confer with Dr. Pirone. Massachusetts is the first state to offer a two-year course in arboriculture, and Dr. Pirone's book, *Maintenance of Shade and Ornamental* Trees, is the standard text used in this course.

Upper — Vinca, pachysandra, ivy and euonymus are planted extensively as groundcovers along the drive and across the area adjacent to the charming New England dwelling and garden wall at "Mill Stream Farm," the gardens of Mrs. Gilbert Kinney at Greenwich, Conn.

Lower—This beautiful specimen of weeping Sargent's hemlock on the spacious lawn of "Quarry Farms," the gardens of Mrs. Reynolds Bagley at Greenwich, Conn., is over a hundred years old.

LET THERE BE HERBS

For years we have been pulling "Bouncing Bet" out of the garden. It creeps around with subversive brittle stems, which break off at the first node underground, as we try to pull it up. As herb fanciers who collect every bit of lore about the one-time uses of plants, we always felt a little regretful because *Saponaria officinalis* was supposed to have provided suds for the early Pilgrims. The pinkish to white flowers will cause water to form a lather when they are shaken in it, like the old-fashioned soap shakers which held all the bits of "Ivory" too small for the bath or wash basin. The phlox-like flower bunches seen at a distance along the roadsides are a very softening influence and comfort the eyes, as they follow the ribbon of concrete or macadam stretching out interminably before them.

Recently, however, when glancing through a report of the Pure Food and Drug Administration, we were convinced that "Bouncing Bet" is indeed a villain — albeit a man-made one. The herb is one of those yielding a powerful compound called "saponin," which is used as a "foaming agent" in soft drinks. Unfortunately, this compound is also a hemolytic agent which means that it will dissolve blood cells! In order to find out the extent of the present-day use of saponins and other hemolytic agents in beverages and to remove them from the market, the Connecticut Pure Food and Drug Commissioner tested sixty-one samples in 1952. (Oddly enough, reports of the Pure Food and Drug Commission take two years to be published and distributed in our state.) Twenty-six samples were passed as unadulterated; seventeen beverages contained saponin and one contained a synthetic hemolytic agent; of nineteen beverages considered illegal, fifteen contained saponin and four contained an unidentified synthetic hemolytic agent or agents variously listed on labels as "paraffine alcohols" or "sulfonated hydrocarbons."

Of course, it is possible to make carbonated beverages without foaming agents and the best of them are so made; but before buying a new brand, it is wise to look at the fine print of the list of ingredients. Very likely it will include "and artificial flavorings" which, unfortunately, has become a mark of American indifference to quality in prepared and packaged foods. Almost every cake mix, cookie package, pudding mix, gelatine mix, and any other store sweet contains the vanilla substitute vanillin. The United States Dispensatory says of it "articles flavored with it leave a peculiar, disagreeable after-taste and retain their flavor only a very short time." Pretty soon our children will not recognize the taste of natural food flavorings, such as vanilla, if we resort to these short-cut mixes entirely. It is too bad that all the technology used to produce a perfect cake through balanced weighing of shortening, eggs, and milk with flour should be undermined by the addition of a cheap substitute for vanilla or chocolate or orange or whatever flavoring is intended. If consumers would write to the large food companies and protest the addition of the flavorings at all, it might do some good. Clementine Paddleford's column in the *New York Herald Tribune* has contained many letters of protest recently, but they might as well be directed to the source.

Any cook with an herb garden at hand who cannot find dozens of delicious ingredients for flavoring summer beverages is certainly lacking in imagination. Instead of rows of coca cola in the refrigerator shelves, why not keep a few quarts of basic punch mix to be zipped up at the last minute with good old ginger ale or root beer.

Basic Fruit Punch with Mint

The following ingredients make a Punch for 50, but they may be divided to yield a smaller batch.

Steep two tablespoons of tea leaves in one and one-half quarts of boiling water. Add one bunch of fresh spearmint, leaving mint and tea leaves in water five minutes. Strain and add one cup sugar, one cup lemon juice, and one quart of orange juice. Cranberry juice may be substituted for orange and lemon juice or pineapple juice may be used in addition to the citrus fruit juices. When serving, pour over a block of ice and add three quarts of Canada Dry ginger ale and three quarts of club soda. Ice blocks can be made in a freezer in plastic food containers; strawberries, mint leaves, and angelica leaves look very appealing, if added to the water before it becomes ice.

GERTRUDE B. FOSTER

BOOK REVIEWS **(from page 134)**

known for her authoritative *Birds in the Garden*, but among her Northwest neighbors she is revered as a charming and factual lecturer, an ardent expert on the subject of mushrooms, president of the Audubon Society in Olympia (the capital of Washington State), and as a constant inspiration to all who know her.

Though Miss McKenny may have aimed this collection at the younger generation, any adult with whom it makes contact will be the richer.

PAT BALLARD
Issaquah, Wash.

NEWS, NOTES, COMMENTS **(from page 139)**

Plant Word Game. At the meeting of the Cosmopolitan Club held at the Lorillard Snuff Mill Restaurant on Thursday, May 19, Mrs. James Cox Brady, President of the Volunteer Associates of The New York Botanical Garden, presented the following amusing word game. The members of the Cosmopolitan Club and their guests were instructed to underline all the words with any plant significance. The one who found the greatest number of these words received, as a prize, membership in The New York Botanical Garden. A very nice idea for a prize, we think.

William is in love with Veronica. He wants to marry her and move to the beach. They can't elope as the brougham has been in an accident, but as you will see his dream will come true and he will soon see his love-apple in a bridal wreath.

Two other eligible bachelors, Timothy and Clem live nearby. Timothy, a wily coxcomb, was the one who purposely hid the box at the corner of the road which caused the accident. He will rue the day as this was the last straw, as far as Veronica was concerned.

Clem is William's real friend, known for his thrift and honesty and when Veronica lost her jewels in the privet, it was to him she turned. She found Clem at his work bench. "Hey, I'm in trouble," Veronica said. He rose from his seat with a wry smile and looking her kindly in the iris said, "Don't rush me. I will do what I canna. I am a slow thinker but sage withal." Veronica in her blue bonnet and fur cape went out with Clem to flag a policeman who was being followed by flocks of little boys wearing dutchman's britches. "I will take stock of this," he said, "but let us have no leak to the press. It is no time for publicity. The papers will first palm it off on a pair of outsiders."

William, our hero, has, meanwhile, fixed the brougham. While harnessing up he was knocked by the horse-tail into the hedge where he found the jewels. He is rewarded by the mint. There are no bleeding-hearts. There is love-in-a-mist. Veronica said, "My hero—oh my sweet William!"

Field Day at The Connecticut Agricultural Experiment Station. Field Day, August 16, at The Connecticut Agricultural Experiment Station will be designated "Donald F. Jones Day" and will highlight the research of Dr. Jones, Head of the Genetics Department. In 1917, Dr. Jones developed the world's first method for producing hybrid corn seed. Henry A. Wallace, former Vice-President and former Secretary of Agriculture of the United States, will be the principal speaker. Mr. Wallace's interest in plant breeding is of long standing. He and his forefathers have been particularly concerned with the breeding of corn. He is the author of the popular book, *Corn and Corn Breeding*.

New Apple 'Wellington.' A new apple resulting from a cross of 'Cortland' by 'Crimson Beauty' in 1924 has been developed at the Experiment Station, Geneva, N. Y., and named 'Wellington' in honor of Professor Richard Wellington. Professor Wellington was in charge of fruit breeding at the station for many years. The fruit of this new variety of apple is attractive, comes early, ripens evenly and may be picked at one time. Therefore the variety should be specially valuable to market gardeners and to commercial apple growers. It is said to make delicious applesauce.

Garden Club Contributes to Research-Laboratory. The Larchmont Garden Club, a garden club affiliate of The New York Botanical Garden, has made a contribution of $25 to the new Research-Laboratory Building.

Errata — p. 69, May-June, 1955 — "looking down on the valley of the Tigris," should read, "looking down on the valley of the Euphrates River;" pp. 72, 73—captions are transposed.

THE NEW YORK BOTANICAL GARDEN

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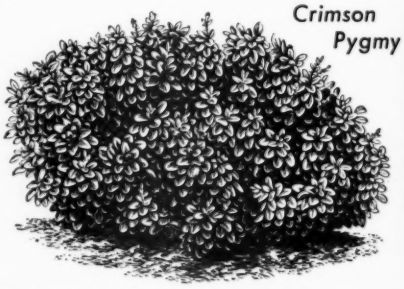

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Campanula, *Wedgewood.* An engaging little dwarf that will capture your heart. From a cushion of lush, deep, green foliage, dozens of brilliant, violet-blue flowers look skyward with twinkling gaiety.

New **Dwarf Barberry, *Crimson Pygmy.*** It's not surprising that demand for this choice, new, miniature, red-leafed Barberry has been so overwhelming. The glowing color and rare charm of the bushy, low growing plants are quite irresistible. Bronzy, blood-red leaves sparkle with brilliant highlights in the sunlight. Stunning in front of shrubs, along walks or as a specimen. Requires no pruning.

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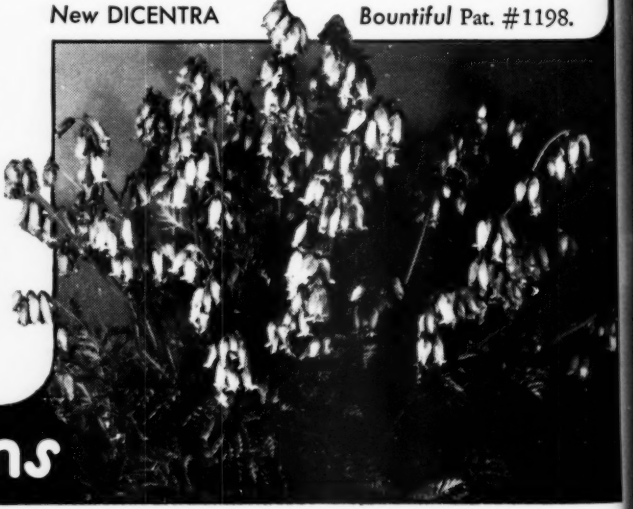
New DICENTRA *Bountiful* Pat. #1198.



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